

**State of Illinois  
Energy Assurance Plan  
Version 4.0**



**Publication Date: August 14, 2013**

**Illinois Department of Commerce and Economic Opportunity  
State Energy Office**

## **Disclaimer and Acknowledgements.**

Acknowledgment: "This material is based upon work supported by the Department of Energy under Award Number(s) DE-FC09-NT{OE0000087}."

Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

The Illinois Energy Assurance Plan was prepared by the Illinois Department of Commerce and Economic Opportunity. The document supports Illinois Public Act ([20 ILCS 1105/](#)) which requires the state to develop energy contingency plans which shall include procedures for determining when a foreseeable danger exists of energy shortages and actions to be taken to minimize hardship to state citizens.

The Illinois Energy Assurance Plan, Supply Disruption Tracking Plan and Appendices were made possible through a grant provided by the National Association of Energy Officials and the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability. The content of the plans and appendices may not necessarily reflect the opinion or policy positions of the National Association of State Energy Officials, the U.S. Department of Energy or the Office of Electricity Delivery and Energy Reliability or any of their affiliates.

The Illinois Department of Commerce and Economic Opportunity would like to acknowledge the Illinois Commerce Commission, the Illinois Terrorism Task Force and the Illinois Emergency Management Agency for their guidance and assistance in plan preparation, testing and dissemination.

## Table of Contents

Disclaimer and Acknowledgements. ....	2
Executive Summary .....	5
Introduction and Purpose .....	7
Introduction.....	7
Purpose.....	7
Section One. Overview of Energy Production, Use, and Disruptions .....	9
Summary description of state’s energy use .....	9
State energy producers .....	11
Historical disruptions .....	16
Section Two. Energy Emergencies and Response .....	19
Legal Authority .....	19
State agencies and their roles .....	21
Coordination of response .....	22
Emergency communication procedures .....	22
Mutual Aid Networks .....	25
Response and coordination within and between state agencies.....	26
Consequences and severities of energy emergencies and rate of recovery .....	29
Role of State Energy Emergency Assurance Coordinator .....	30
Contacts with private sector.....	30
Management decision process .....	31
Responsibility for the identification and assessment of disruptions .....	33
Procedures for issuing a declaration .....	33
Public information program.....	33
Section Three. Individual Energy Source Response Plans .....	35
Monitoring system .....	35
Petroleum (gas, diesel, heating oil, propane, ethanol, etc.) .....	37

Natural gas .....	42
Electricity and electricity energy sources .....	44
Section Four. Critical Infrastructure Plan .....	53
State plan for enhancing resiliency and protecting critical infrastructure .....	53
Section Five. State of Illinois Energy Assurance Geographic Information System .....	71
Electrical .....	71
Natural Gas .....	72
Transportation fuels (petroleum) .....	73
Acronyms .....	75
Appendices.....	77
Appendix 1. State of Illinois Energy Supply Disruption Tracking Process .....	77
Appendix 2: Illinois State Tracking Supply Disruption Database .....	109
Appendix 3. Contacts for State Energy Assurance (Phone numbers removed for privacy but are available on internal document) .....	110
Appendix 4. State Energy Fact Sheets .....	113
Appendix 5. GIS Database Layers and Attributes .....	117
Appendix 6. After Action Reports from Intrastate, Interstate and Municipality Exercises .....	119

## Executive Summary

The State Energy Office within the Illinois Department of Commerce and Economic Opportunity is pleased to present this Energy Assurance Plan in cooperation with the Illinois Commerce Commission and the Illinois Emergency Management Agency. The purpose of the plan is to 1) catalog the State of Illinois' current and historical energy sources and uses; 2) identify potential disruptions to these sources via damage to infrastructure from man-made or natural disasters; 3) identify potential disruptions from unexpected price increases or loss of supply; 4) estimate the effect these disruptions would have on the state's citizens; 5) and delineate the ways in which the state can assist in the restoration of the energy supply. All communication with policy makers and government agencies will be through the Illinois Commerce Commission Department of Homeland Security for disaster-related disruptions or the Illinois Department of Commerce and Economic Opportunity's State Energy Office for supply shortage issues. All communication with the public will be through the Governor's Office.

This plan will summarize the past, current, and predicted future energy use in the State of Illinois and describe current programs and regulations in place to monitor energy and prepare for and recover from an energy emergency. It will identify and address potential shortcomings in the system and describe the means of overcoming these shortcomings.

The State of Illinois has a robust energy emergency recovery plan. The State Emergency Operations Center (SEOC) has been deemed one of the best in the country. The state's response to energy emergencies in the past has been efficient and rapid. However, there were indications in the past that the state was not adequately monitoring long-term supply and pricing of the raw materials and sources of energy production as well as petroleum and natural gas infrastructure, transportation, and supply. As a result, the state may have found itself in a reactive position if prices were to suddenly rise above what is affordable for citizens without plans for replacement or conservation. This plan addresses the methods the state has put into place for long term monitoring of energy supplies and responding to natural gas and petroleum shortages.

In addition, the plan addresses the roles and responsibilities of different state agencies, identifies when the state becomes involved in energy disruptions and restoration, describes appropriate communication within the state, between the state and others in the event of a disruption, and identifies available state assistance for energy restoration.

In the State of Illinois, the initial responsibility for responding to energy emergencies falls in the hands of local municipalities and private energy providers. When it is clear that local and private resources are insufficient for timely restoration of energy sources, the state becomes involved. In order to determine when this is appropriate, the state has reviewed previous disruptions and their impact and provided a means for local government, law enforcement, and private energy providers to quickly contact the state to request assistance when appropriate. The Governor will

decide when state assistance is appropriate. The Illinois Emergency Management Agency oversees disaster recovery, and more specifically, the Illinois Commerce Commission oversees recovery from energy disruptions with the assistance of the Illinois Department of Commerce and Economic Opportunity, Illinois Department of Transportation, the Illinois Department of Central Management Services, and the Illinois Department of Corrections. The state agencies involved in energy assurance and disruption response were involved in the development of this plan. The theme that came up repeatedly was the need for effective communication. It is hoped this plan will clearly define the lines of communication prior to, during and after an energy emergency.

Illinois obtains the majority of its energy from four sources: petroleum for transportation, natural gas for heating, and coal and nuclear power for electricity. Most of the natural gas and petroleum is imported into the state also, while Illinois is a net producer of electricity and leads the nation in electricity generated from nuclear facilities. The state is a hub for natural gas and petroleum pipelines and leads the Midwestern U.S. in refining capacity.

The infrastructure associated with energy in Illinois (pipelines, processing and refining facilities, generating facilities, and transmission lines) is vulnerable to natural and man-made threats. Past disruptions have been dominated by weather-related events, but catastrophic events such as acts of terrorism or a large-scale earthquake are potential threats to energy supplies. Any of a number of threats could lead to electrical blackouts, supply disruptions, or rising petroleum and energy prices. As a result, specific plans to prepare, monitor, and respond quickly to energy emergencies or shortages have been developed. These plans are included in this document.

The intent of this document is to ensure the citizens of Illinois receive the most reliable and affordable energy available while encouraging conservation and a movement toward clean, renewable energy sources. The plan will be a living document with annual updates available on the internet for state citizens and other interested parties. It is noted here that suggestions and input from the public and any interested parties are welcome.

## **Introduction and Purpose**

### **Introduction**

The Illinois Energy Assurance Plan (IEAP) should serve as a guide for how the state will prepare for and respond to energy shortages in the form of short-term sudden disruptions or long-term disruptions caused by shortages in supply or dramatic price increases. The IEAP will be updated and enhanced based on lessons learned from exercises and actual response and recovery operations. Periodic updates to the IEAP will include changes due to lessons learned, new technology, new methods of response, or additional capabilities.

Private energy providers and local governments in the State of Illinois have the capabilities and primary responsibility for response to and recovery from energy supply disruptions. When these capabilities are exceeded, state assistance is available. In addition, the state must prepare for longer energy disruptions caused by scarcity of raw materials, price increases, use of new materials, or alternative sources of energy by state energy providers and consumers. The state also must monitor the energy infrastructure to ensure it remains viable. This plan is the guide for state preparedness, monitoring, response, and recovery operations; it outlines actions in support of local response to and recovery from hazards and state methods for monitoring energy supply, price, and infrastructure. The plan discusses state energy needs, potential disruptions to the energy supply, and the response mechanisms in place at the state level to restore energy if a disruption occurs.

### **Purpose**

The purpose of the IEAP is to provide guidance to state agencies and Illinois citizens on how the state will prepare, monitor, respond to, and recover from disruptions in energy supply and delivery. It incorporates applicable provisions from the Illinois Emergency Operations Plan (IEOP).

The IEAP considers energy supply disruptions that will require a significant state presence. A “significant state presence” is defined as a situation that requires the assistance of state agencies in addition to those that routinely respond to day-to-day contingencies under separate authorities such as the State Police, local government authorities, or private sector energy providers. Those situations requiring only local government or private energy provider response are not addressed in the IEAP.

The IEAP contains assignments for state monitoring, response, and recovery activities related to energy supply disruptions. It, however, is not a regulatory document. It has been developed based on the compilation of various state documents and with the cooperation of state agencies. The plan describes the relationships among the state and federal agencies, local governments, and private energy providers, and among state agencies. The plan provides information on

anticipated actions for state agencies that have energy supply monitoring and restoration responsibilities. Finally, it provides information on the various state response mechanisms, capabilities, and resources available to local governments. It also addresses state agencies, personnel, and methods necessary to monitor long term energy supply and the energy infrastructure.

The plan addresses those emergency support activities necessary for a coordinated state response to a significant disruption in energy supply, regardless of cause. The level of response will be determined by the magnitude of the disruption. The Governor will make the final determination of the level of state response.

## Section One. Overview of Energy Production, Use, and Disruptions

### Summary description of state's energy use

Illinois is the fifth most populous state in the U.S and is fifth in energy consumption. Its central location and large population make it a large consumer and transporter of energy. The state used just over 4.4 trillion British thermal units (Btu) of total energy in 2010 ([EIA](#)), which is 4% of the US total. At the same time, the state produced just over 2 trillion Btu of energy, making it a net importer. Illinois is also ranked 5<sup>th</sup> in the country in industrial manufacturing but ranked 29<sup>th</sup> for per capita in energy use, indicating its industrial base may not be energy intensive. The state has limited reserves of petroleum and natural gas and must import these from other states or countries. Illinois also has a large coal reserve (producing 33.7 million short tons in 2009), but much of the coal is currently not mined and is high in sulfur. The state imported 94% of the coal used for electrical generation (37.2 million tons) in 2008. It is, however, a net exporter of electricity with an active nuclear generation industry. Illinois has 11 operating reactors at 6 facilities and ranks 1<sup>st</sup> in the nation in nuclear electrical generation.

Table 1 indicates the energy sources and total Btu for Illinois in 2010. Twenty-eight percent (up 4% from 2008) of the total energy used in Illinois was from nuclear generated electricity versus the national average of 8.5%. This could be a critical difference in Illinois' energy portfolio and needs to be taken into account when considering energy assurance and potential disruptions. Nuclear energy is considered by many to be clean and renewable, but the waste removal requirements have made nuclear power controversial. Moreover, Illinois' plants are aging. Illinois does have a very active monitoring program; and the plants are operating at capacity, which is also increasing with improved efficiencies. The plants are expected to continue operation beyond their current proposed lifespan of 30 years as safety records and rigorous monitoring indicate they can continue to function well within guidelines.

Table 1.2010 Illinois Energy Use In Trillions Of Btu (source: US DOE/EIA)

State	Total Energy	Coal	Natural Gas	Petroleum	Nuclear	Renewable	Interstate Elec. Flow
Illinois	4,430	1,069	935	1,230	1,005	191	-493.7
%	100%	24%	21%	23%	28%	4%	-12%

In 2010, only 4% of Illinois' energy came from renewable sources (such as wind, solar, hydro-electric, and corn-based ethanol). In August of 2007, the state adopted a renewable energy standard requiring state utilities to produce at least 25% of their energy from renewables (75% to come from wind) and to improve efficiency by 2%. The state must build special considerations into the electrical grid to support wind power. Electricity from wind is intermittent, but the

electrical grid is designed to anticipate needs and provide total energy requirements for all periods. Installing natural gas powered generators to accompany wind operations would make up for intermittent loss of wind power because the generators can fire up quickly and change output to compensate. Unfortunately, use of the natural gas for these generators, while producing fewer greenhouse gas emissions, can be more expensive than electricity generated from coal potentially impacting rates and offsetting any cost gains from wind.

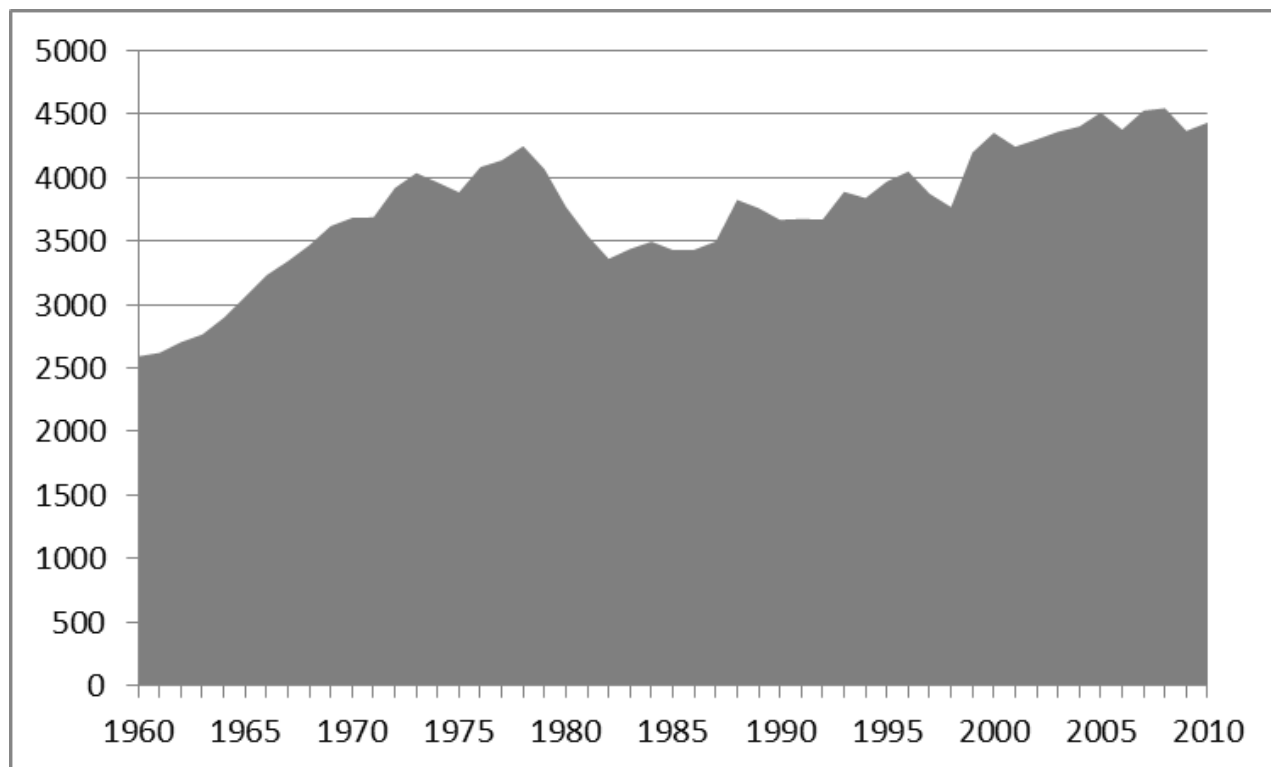
An overview of Illinois' energy strengths and weaknesses would indicate the state is a major transportation, distribution, and oil refining location and produces a good deal of electricity, but also imports much of the raw materials for energy production (Table 2).

Table 2. Strengths And Weaknesses Of Illinois Energy Supplies

Strengths	Weaknesses
<div data-bbox="735 747 878 779"><b>Petroleum</b></div> <div data-bbox="201 789 727 1157"> <ul style="list-style-type: none"> <li>* Leads the Midwest in refining capacity</li> <li>* Numerous pipelines run through and terminate in state</li> <li>* 4 in-state refineries</li> <li>* Oil comes from Canada and Gulf Coast to Illinois refineries</li> </ul> </div>	
<div data-bbox="735 1209 878 1241"><b>Electricity</b></div> <div data-bbox="201 1251 753 1440"> <ul style="list-style-type: none"> <li>* Top nuclear electricity producing state in US</li> <li>* 3<sup>rd</sup> largest coal reserves in U.S.</li> <li>* Leading producer and net exporter of electricity</li> </ul> </div>	
<div data-bbox="724 1493 889 1524"><b>Natural Gas</b></div> <div data-bbox="201 1535 748 1640"> <ul style="list-style-type: none"> <li>* Major transportation hub for natural gas</li> <li>* Numerous pipelines run through and end in state</li> </ul> </div>	
<div data-bbox="732 1692 881 1724"><b>Renewable</b></div> <div data-bbox="201 1734 756 1797"> <ul style="list-style-type: none"> <li>* Top producer of corn-based ethanol</li> <li>* Potential for wind and solar contributions</li> </ul> </div>	
<div data-bbox="802 789 1412 1440"> <ul style="list-style-type: none"> <li>* Most of state's petroleum is imported, making the state more vulnerable to supply disruptions</li> <li>* Any disruption in down-stream pipelines effects Illinois production</li> <li>* Not all of petroleum products produced in state are used here. Refineries do ship out of state</li> <li>* Top energy consuming state due to industry</li> <li>* Most of state's coal inaccessible and high in sulfur</li> <li>* Strong reliance on coal and nuclear power (over 95%)</li> <li>* Most natural gas used by state is imported</li> <li>* Any disruption in down-stream pipelines impacts Illinois production</li> <li>* Little potential for hydro-electric</li> <li>* Estimated renewable capacity will not meet state demand</li> </ul> </div>	

A summary of Illinois' energy sources, infrastructure, supply, and demand shows an increased use of all energy sources since 1960 (Figure 1). The EIA expects total energy consumption in the U.S. to increase by 15% by 2022. A commensurate increase in Illinois would be expected. With aging nuclear facilities and increasing regulations on coal powered electrical generation the state will need to find new sources of electrical generation or reduce consumption.

Figure 1. Total Energy Consumption In Illinois From 1960 To 2010 (In Trillions Of Btu).



The state has developed energy fact sheets for the four major energy sources (electric, natural gas, petroleum and renewables) which it has placed on the internet to promote a better understanding of state energy supplies, production and consumption (Appendix 4).

## **State energy producers**

### ***Electricity***

Four investor-owned public utilities provide electricity to consumers in Illinois. Of these, Ameren Illinois (Ameren) and Commonwealth Edison (ComEd) serve the vast majority of citizens and are the most involved in electricity generation (Table 3). Each company has detailed plans and methods for restoration and often leads the way in emergency efforts which they are required by the public utilities act to share with the Illinois Commerce Commission for review.

Each company communicates well and often with the ICC during energy disruptions, letting the agency know their situation and needs.

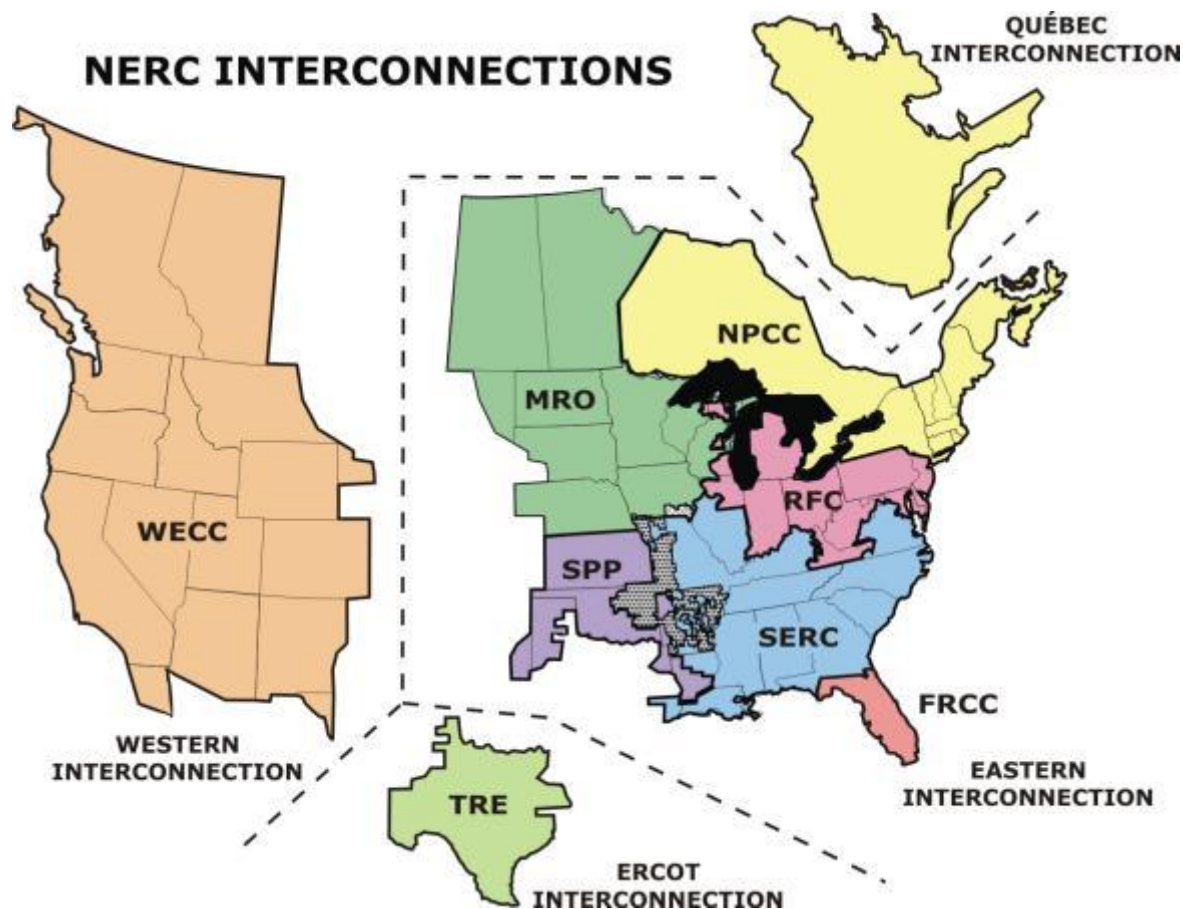
The state also has a number of municipal and cooperative electricity providers. There are 25 electrical cooperatives and three power generation and transmission cooperatives in the state. Sixty-four municipalities in Illinois also operate their own electrical utilities. Neither the municipal utilities nor the electrical cooperatives are required to report outages or work with the state in restoration efforts, but both groups have found it to their advantage to do so. These groups have created associations [the Illinois Municipal Utilities Association (IMUA) and the Association of Illinois Electric Cooperatives (AIEC)]. Each of these associations is the state government's point of contact for individual utilities in the case of disruptions that exceed the utility's restoration capability. The association then works with the state for restoration, relaying needs to the state. This works well in the case of large scale outages and allows the state to have one point of contact for emergencies. Each of these associations also has its own emergency operation plans which they have developed with their members and have shared with the state. The municipalities in Illinois also have a mutual aid network, [Illinois Public Works Mutual Aid Network](#), which organizes sharing of resources.

Table 3. Electricity Providers and The Numbers of Their Customers in Illinois in 2010

Utility Name	Location in Illinois	# of Customers
Ameren Illinois	Central and southern	1,211,412
Commonwealth Edison Company	Northern	3,792,295
Mid-American Energy Company	Northwestern	84,746
Mt. Carmel Public Utility Company	Southern	5,518

Illinois is split between two of the nine North American Electric Reliability Corporation (NERC) zones, which consist of different electricity transmission and distribution grids: the Reliability First Corporation (RFC) zone and the South East Reliability Corporation (SERC) zone. Except for locations with municipal utilities, Ameren is responsible for distributing and delivering the electricity within the SERC zone and ComEd is responsible for the RFC zone (Figure 3). Likewise, wholesale purchasing and selling of electricity is the responsibility of Midwest Independent Transmission System Operator (MISO) in the SERC zone and of Pennsylvania Jersey Maryland (PJM) in the RFC zone. MISO and PJM each have large scale monitoring facilities and work with the generating facilities to predict the electrical load at different times along the grid and ensure electricity is available. Many of the state's electrical generating facilities are owned by sister companies of Ameren and ComEd (all of the nuclear facilities are owned by Exelon, a sister company to ComEd). The Illinois Electric Supplier Act (220 ILCS 30/1) allows for more than one electrical supplier to service any area in Illinois. This was designed to lower costs to consumers but can add to consumer confusion when outages occur.

Figure 2. North American Electric Reliability Zones which Represent Inter-Connected Electrical Infrastructure Regions.



There were 179 electricity generating plants in Illinois in 2009 according to the USEPA's [eGrid website](#) which were owned by over 100 different companies or municipalities, but many of these are small diesel or natural gas plants designed to serve a specific location or function as a backup. Many smaller natural gas plants were also designed to serve as reserve for peak electricity use in the summer. The 6 nuclear plants produced 48% of the electricity for the state. The 20 plants with the greatest megawatt output (all coal or nuclear) generated almost 90% of Illinois' electricity (Table 4). These plants were owned by six companies, two of which are sister companies to Ameren and ComEd. Each large plant has its own EOP in place for disruptions with nuclear facilities having advanced plans and frequent exercises.

Table 4. List of Top 20 Electrical Generating Plants in Illinois in 2009 with Their Contribution to the Total Electricity Generated

<b>Plant primary fuel</b>	<b>Plant annual net generation (MWh)</b>	<b>% of State Total</b>	<b>Cumulative % of Total</b>	<b>Plant owner name (first)</b>
Nuclear material	19,796,383	10.2%	10.2%	Exelon Energy
Nuclear material	19,119,557	9.8%	20.0%	Exelon Energy
Nuclear material	18,713,658	9.6%	29.7%	Exelon Energy
Nuclear material	13,622,453	7.0%	36.7%	Exelon Energy
Nuclear material	13,318,876	6.9%	43.6%	Exelon Energy
Subbituminous coal	12,618,528	6.5%	50.1%	Dynegy Inc
Subbituminous coal	9,469,508	4.9%	54.9%	Edison Mission Energy
Nuclear materiel	8,692,074	4.5%	59.4%	AmerGen Energy Co LLC
Subbituminous coal	7,881,898	4.1%	63.5%	AmerenCIPS
Subbituminous coal	7,297,242	3.8%	67.2%	AmerenEnergy Resources
Subbituminous coal	6,142,876	3.2%	70.4%	Dominion Energy NUGs
Subbituminous coal	5,498,462	2.8%	73.2%	Edison Mission Energy
Subbituminous coal	5,288,882	2.7%	75.9%	Edison Mission Energy
Subbituminous coal	4,732,059	2.4%	78.4%	Edison Mission Energy
Bituminous coal	4,450,529	2.3%	80.7%	AmerenEnergy Resources
Subbituminous coal	4,393,834	2.3%	82.9%	AmerenEnergy Resources
Subbituminous coal	2,965,873	1.5%	84.5%	Edison Mission Energy
Subbituminous coal	2,965,398	1.5%	86.0%	Dynegy Inc
Subbituminous coal	2,934,587	1.5%	87.5%	Dynegy Inc
Bituminous coal	2,084,104	1.1%	88.6%	City of Springfield

### ***Petroleum***

Illinois is a major delivery and transportation hub for raw crude oil with four refineries in the state and another just across the border in Indiana (Table 5). Several pipeline companies deliver crude oil to these refineries. The ICC lists 26 pipeline companies certified in Illinois. These include each of the companies that own a refinery plus Enbridge, which provides an ever-

increasing amount of Canadian crude, and a few other smaller companies. Each refinery has extensive plans for emergencies and disruptions. The refineries and pipeline companies are not required to share their EOPs with the state, but have participated in state exercises and shared their reactions to scenarios with the state.

Table 5. List of Illinois Refineries and Their Capacities

<b>Company</b>	<b>Nearest City</b>	<b>Barrels per Day</b>
Citgo	Lemont	181,000
ExxonMobil	Joliet	248,000
Marathon	Robinson	204,000
ConocoPhillips	Wood River	306,000
BP	Whiting, IN	405,000

Oil, originating as raw crude, is refined into petroleum products (gasoline, propane, diesel etc) at the refineries; and additional pipelines transport the products to wholesalers, retailers and value-adders. Gasoline is transported to the 25 terminals in Illinois where it is mixed with additives for each gasoline station and transported via semi-trailer to the stations that are primarily independently owned.

### ***Natural Gas***

Nine separate companies are certified to offer natural gas to consumers in Illinois while sixty-four municipalities operate their own natural gas utilities, along with seventeen companies that are listed as alternative gas providers (Table 6). Along with electricity, Ameren is responsible for natural gas distribution and delivery in much of the MISO region of Illinois.

Table 6. Utilities Certified to Sell Retail Natural Gas in Illinois

<b>Utility Name</b>	<b>Location in Illinois</b>	<b># of Customers</b>
Ameren	Central and southern	814,773
Atmos Energy Corporation	Southern	22,498
Consumers Gas Company	Southern	5,540
Illinois Gas Company	Southern	9,723
Mt. Carmel Public Utility Company	Southern	3,574
Nicor Gas Company	Northern	2,172,724
North Shore Gas Company	Northern	158,001
Peoples Gas Light and Coke Company	Northern	821,902
MidAmerican Energy Company	Northern	65,542

Several companies own natural gas pipelines which operate in Illinois. These pipelines must follow the same guidelines as petroleum pipelines with the federal government's National Transportation Safety Board for interstate lines and the Illinois Commerce Commission (ICC) for intrastate. All companies offering natural gas in Illinois have EOPs. Nicor, which serves the largest number of customers in Illinois, has EOPs for several scenarios. Nicor and Ameren are active in emergency training exercises. All companies with natural gas pipelines and facilities in Illinois must file a safety plan with the ICC.

## Historical disruptions

The largest disruption to the state's energy supply has been to electricity caused by weather, specifically thunderstorms, tornadoes, heavy winds, and ice storms. [The State of Illinois Emergency Operations Plan](#) (IEOP) lists the fifteen primary hazards for the state broken into three categories. The risk is based on historical events and potential threat (natural, technological, and human-caused) (Table 7).

Table 7. A List of the Highest Risk Hazards for the State of Illinois

Hazard		
Natural	Technological	Human-Caused
1) Severe weather	8) Haz-Mat - chemical	11) Terrorist act
2) Tornado	9) Haz-Mat - radiological	12) Civil disobedience
3) Flood	10) Dam failure	13) Cyber attack
4) Drought		14) Agricultural epidemic
5) Extreme heat		15) Public health epidemic
6) Severe winter storm		
7) Earthquake		

The Illinois Emergency Management Agency (IEMA) has released a [State of Illinois Natural Hazard Mitigation Plan](#) (INHMP) that identifies potential natural hazards and vulnerabilities for the state, as well as strategies for mitigating the effects. This plan is comprehensive and lists severe thunderstorms and tornadoes, floods, severe winter storms, drought, extreme heat, and earthquakes as the natural hazards for which the state is at greatest risk. As a component of the plan, previous federal disaster declarations were summarized for the years dating back to 1957. These indicate that flooding has been the most frequent cause of federal disaster declaration with tornadoes and severe thunderstorms (all of which may coincide) also being a concern (Table 8). All of these will affect the electrical infrastructure and transportation of fuel. Extreme heat could tax the electrical system while threatening to reduce output from nuclear facilities which may have to reduce output to ensure cooling ponds do not overheat. Flooding and earthquakes could affect the natural gas and petroleum pipeline distribution network as well as the electrical

infrastructure and transportation network. During the 2009 severe storm outbreak in southern Illinois, damage to natural gas pipelines from uprooted trees was significant. Severe storms and tornadoes may also damage renewable resources such as windmills and solar arrays.

TABLE 8. Lists of Events Associated with Federal Disaster Proclamations Since 1957

<b>Natural Disaster</b>	<b>Number Since 1957</b>
Floods	33
Tornadoes	15
Severe thunderstorms	11
Winter storms (ice or snow)	7
Hurricane (Katrina)	1

In addition to identifying historical disasters, the INHMP identifies the potential risk for future disasters in each Illinois county along with the potential severity of that disaster based on historical events. Potential risks based on historical events are listed in Table 5. The northern half of the state was listed as having high potential for severe damage from storms. Those counties along the Mississippi River and Cook County were listed as severe risks for floods.

Table 9. Risk levels for potential hazards based on past events (from INHMP)

<b>Risk Level</b>	<b>Number of Historic Events</b>
Low	0-12 (green)
Guarded	13 to 24 (blue)
Elevated	25 to 36 (yellow)
High	37 to 48 (orange)
Severe	49 to 60 (red)

IEMA has also released a State of Illinois Human-Caused Hazards Mitigation Plan (IHCHMP) which includes the Illinois Technological Hazards Mitigation Plan (ITHMP). The plan addresses a variety of human and technological hazards (Table 10). Those of greatest concern to energy assurance are 1) terrorist acts and dam failure with their effect on infrastructure; 2) public epidemic with its impact on workforce; 3) and cyber threats with their potential damaging effect on the SCADA systems which run electrical components for pipelines, refineries, electrical generating plants, electrical transmitters etc., especially as the use of smart grids for electricity which rely on software, becomes more prevalent.

The IHCHMP lists the threat of terrorism as high in all counties in Illinois. The risk of all other human-induced and technological hazards is elevated in most counties, but high in the counties around Chicago and severe in Cook County (Chicago). The risk of all human-caused and

technological threats is listed as severe in Cook County because of the dense infrastructure and population in Chicago.

## Section Two. Energy Emergencies and Response

### Legal Authority

#### *Emergency Response*

Authority for emergency response in the state of Illinois is enacted in the [Illinois Emergency Management Agency Act \(20 ILCS 3305/6\(2\)b,c and 7 \(11\)\)](#). This act authorizes the Governor to 1) create the Illinois Emergency Management Agency (IEMA) and emergency management programs within appropriate state political subdivisions, 2) appoint the director of IEMA, 3) have general direction and control of IEMA, 4) provide for the rendering of mutual aid in the case of a disaster, 5) provide funds for disaster recovery, 6) declare a disaster which gives the governor emergency powers including:

- Suspend any regulations which could delay disaster response
- Access and utilize all available state resources toward disaster recovery
- Transfer duties of state agencies and personnel toward disaster recovery
- Acquire personal property or property to be used in disaster recovery (with compensation). This is relevant to energy assurance as gasoline, generators and other energy supplies or generating equipment can be accessed
- Recommend evacuation
- Control routes to and from disasters and access to disaster sites
- Control sales of alcoholic beverages, firearms and combustibles.
- Make provisions for emergency housing
- Control, restrict and regulate the sale of food, fuel and other commodity items. *This is obviously relevant to energy assurance also as the Governor can use quotas and fix the price of transportation fuels and other energy-related items. )*
- Governor is commander and chief of all state militia.
- Prohibit increases in the prices of goods and services. *This too is relevant to energy assurance as the Governor can ensure fuel prices remain stable during a disaster.*

The act defines a disaster as “an occurrence or threat of widespread or severe damage, injury or loss of life or property resulting from any natural or technological cause including...critical shortages of essential fuels and energy...”. What constitutes “critical shortages of essential fuels and energy” will be interpreted by the Governor and his office, but it is hoped information in this plan and generated by the supply disruption tracking plan will assist in this decision.

Also within the act are well defined guidelines for IEMA and local and regional emergency management entities. A requirement of the act is the development of the Illinois Emergency Operations Plan (IEOP) which defines state agency responsibilities in response to a disaster. The requirement for IEMA to exercise the plan is also in the act.

[The Disaster Relief Act \(15 ILCS 30/0.01\)](#) defines how the Governor appropriates funds during a disaster and works with the federal government, if appropriate, to obtain federal disaster relief.

The state does have weight limitations for vehicles under [Illinois Compiled Statutes 625 ILCS 5 Illinois Vehicle Code](#) Section [15-111](#) but these load limits are waived for utility vehicles “when operated by a public utility when transporting equipment required for emergency repair of public utility facilities...”. Section [15-301](#) does give the Illinois Department of Transportation (IDOT) the authority to issue permits allowing vehicles to be above the weight limit. IDOT does issue these permits in situations in which heavy equipment is required for disasters.

The Illinois Vehicle Code also covers the maximum number of hours a driver may operate a vehicle (per day (15 hours) per 7 day period (70 hours)) under section 18b-106.1. These are above the requirements of the Federal Motor Carrier Safety Administration (FMSCA) for interstate transport. IDOT can also offer waivers for driver hour overages during an emergency, and the Governor can also waive the state limitations in times of emergency.

### ***Electrical and Natural Gas Utilities***

[The Illinois Public Utilities Act \(\(220 ILCS 5\)](#) is the primary source of regulation for utilities in the state. The act was written to try to ensure state citizens received reliable, affordable electricity and natural gas. The act created the Illinois Commerce Commission (ICC). The commission has supervision over the state’s public utilities, reviewing the utility’s general condition, rates, generating plants etc. The commission reviews the security policy of each utility, ensures they practice at least one exercise a year and that electrical utilities maintain North American Electric Reliability Council (NERC) security standards. The public utilities act contains language requiring the ICC to maintain staff that can aid the public utilities with “electronic trespass enforcement” which would be the equivalent to cyber-security issues. The act gives the ICC authority to file an action in circuit court if a utility is in violation of any Illinois law which the utility must answer within 20 days and be penalized if found guilty by the court. The ICC also has authority under the act to investigate, hold hearings and issue orders against utilities if they may be in violation of the terms of the public utility act or consumer protection laws.

[220 ILCS 15 Gas Storage Act](#), [220 ILCS 20 Illinois Gas Pipeline Safety Act](#) and [220 ILCS 25 Gas Transmission Facilities Act](#) are the primary regulations regarding the storage and transportation of natural gas in Illinois. The gas storage act deals mainly with the safe, cost-effective storage of natural gas and the rights of the natural gas companies to purchase and alter property for that use. The pipeline safety act gives authority to ICC to develop safety guidelines for intrastate pipelines, requires gas companies provide plans to the ICC on their safety guidelines for pipeline facilities and the pipelines themselves, and gives the ICC the authority to convene court hearings if they find a plan is inadequate. The ICC has chosen to follow federal gas pipeline safety act “Natural Gas Pipeline Safety Act of 2006” for their safety requirements.

The act requires pipeline companies to report all accidents associated with pipelines and facilities to the ICC and gives the commission the right to request civil penalties if safety guidelines are not followed. The act also states that the public utilities act applies to pipelines and facilities.

### ***Petroleum***

Illinois does not directly regulate the petroleum industry, and therefore, the regulations regarding this industry are more limited. However, various laws are in place to protect public safety including [Titles XVI - Petroleum Underground Storage Tanks](#) and [VI-C - Oil Spill Response](#) under the [415 ILCS 5 Environmental Protection Act](#) which require anyone owning facilities, a tank or a pipeline which results in a leak to report the leak to the Illinois Environmental Protection Agency, thereby ensuring the state will be notified if a large leak which, beyond the risk to life and the environment, could impact supply, should occur.

Illinois does have an alternative fuels act ([Illinois Alternate Fuels Act. - 415 ILCS 120](#)) which does require the IL EPA to promote the use of alternative fuels for transportation (ethanol, bio-diesel, electric vehicles, ride sharing) including funding to support these efforts from fees from commercial vehicle users.

### ***Energy Assurance***

Illinois Public Act ([20 ILCS 1105/](#)) Energy Conservation and Coal Development Act provides language for the Illinois Department of Commerce and Economic Opportunity to develop “energy contingency plans” which shall include “procedures for determining when a foreseeable danger exists of energy shortages...and...actions to be taken to minimize hardship”. The energy assurance plan has taken on this role for the state.

### ***State agencies and their roles***

The Illinois Emergency Management Agency (IEMA) coordinates the state’s overall emergency management program by working with local governments, state agencies, political subdivisions of the state, private organizations, and the federal government. IEMA coordinates when appropriate, with the Federal Emergency Management Agency (FEMA) and other federal agencies to provide disaster assistance following major disasters. IEMA provides emergency response operations related to communications, notification, incident command, and emergency response support to local governments. IEMA has divided the state into eleven regions (Figure 3). Each region has a coordinator who responds to local government and private sector requests for assistance during an energy emergency. The regional coordinators reach out to the state IEMA office when the resources required for the response are beyond those the region or local governments can provide.

Figure 3. Illinois emergency management regions



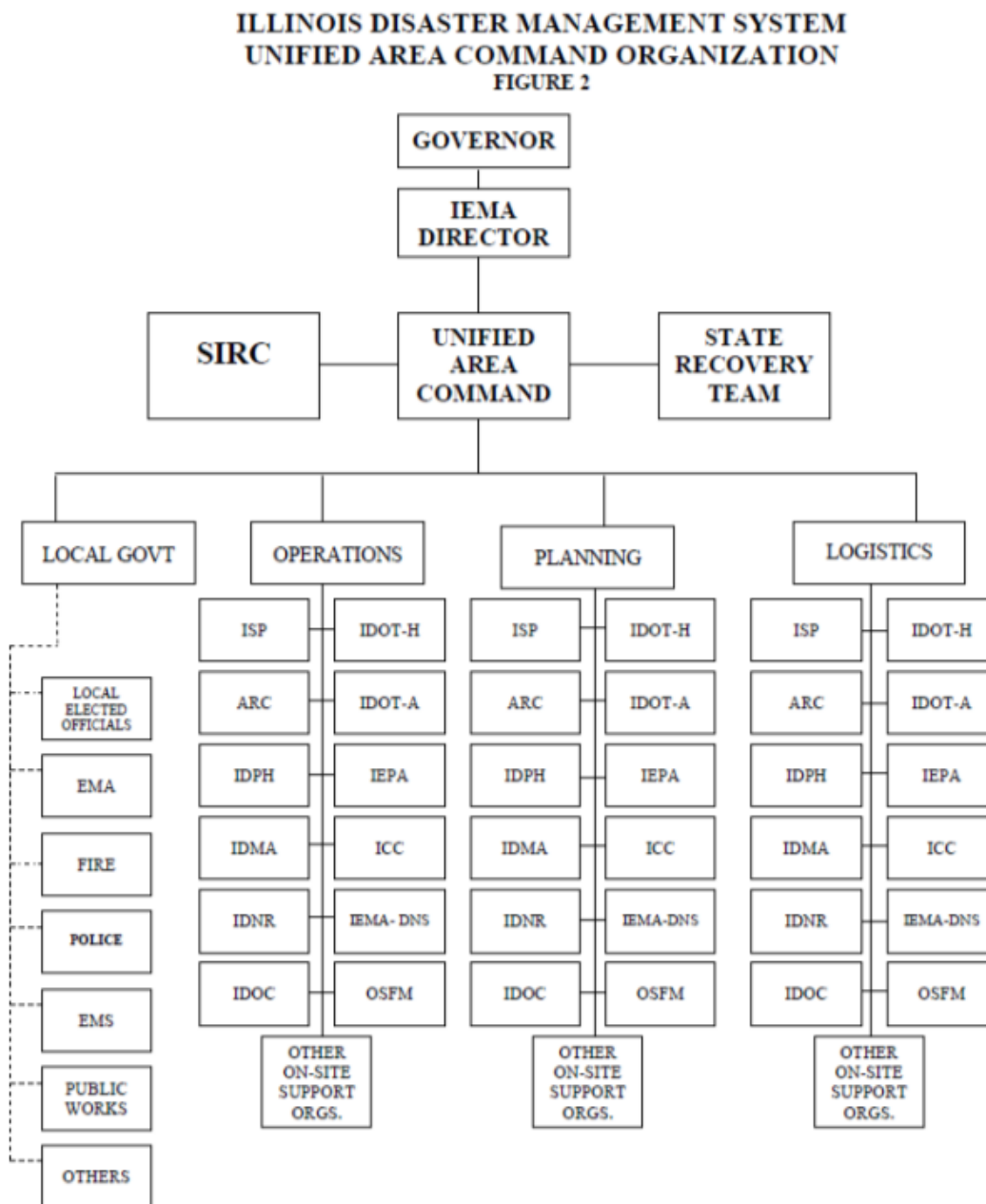
## Coordination of response

### Emergency communication procedures

The Governor's Office determines the level of state response to any human-caused or natural disaster affecting the people of the State of Illinois. The IEMA Director, reporting to the Governor, manages and coordinates state operation, in accordance with the National Incident Management System (NIMS). The personnel, facilities, and equipment for responding to a disaster will be located in the State Incident Response Center (SIRC- a component of the State Emergency Operations Center (SEOC)). The IEMA director is responsible for activating the SIRC. Guidelines for emergency response and recovery operations are described in detail in the

[Illinois Emergency Operations Plan](#) (IEOP) which includes the Illinois Disaster Management System (IDMS) (Figure 4). Guidelines specific to energy sector emergency response can be found in “[Emergency Support Function \(ESF\) 12 – Energy](#)” of the IEOP. The ICC is listed as the primary agency responsible for energy sector restoration after a disruption in the ESF-12.

Figure 4. Illinois disaster management system unified area command organization (from the Illinois Emergency operations plan)



The State Emergency Operations Center (SEOC) is located in Springfield, Illinois and consists of a large operations facility with state-of-the-art equipment (computers, communications, etc.) in which representatives from state, private, and federal entities report and coordinate recovery efforts. IEMA activates the SEOC in state emergency situations. Within the SEOC is the State Incident Response Center (SIRC), the room where various government agency personnel gather, communicate, and monitor emergency response efforts during SEOC activation. Also within the SEOC are the Radiological Emergency Assessment Center (REAC), the State Terrorism and Intelligence Center (STIC), and the Communications Center. Only certain partners within the SEOC may be activated if an emergency only affects these segments. An IEMA spokesperson for public relations (Public Information Officer (PIO)) also reports to the SEOC when a disaster is declared and has support staff to handle communications with the public and policy makers. The following are communication procedures outlined in the IEOP for initiating the Unified Area Command (UAC) for field operations, the SIRC, and the SEOC once the Governor has approved state involvement in an energy disruption recovery effort.

- The State UAC will coordinate field (operational/tactical) response activities.
- A UAC may be established for any level of emergency requiring a state field presence; however, the location, activities, and scope will vary according to the parameters of the occurrence.
- IEMA will activate the SEOC. Agencies will send representatives to the SEOC as requested.
- IEMA will provide mission assignments and tasks.
- State Agency Duty Officers/SIRC Liaisons will be notified in accordance with IEMA Communications Center procedures. Agencies are responsible for internal notification of personnel.
- Each activated Emergency Support Function Annex (energy is Annex 12) will send representatives to the SIRC and/or UAC, as appropriate, to coordinate state response to the disaster or emergency. The SEOC representative from ICC will be notified for energy sector concerns. If it is not warranted, the energy annex will not be activated and ICC will not be contacted.
- Agencies will execute mission assignments and provide technical assistance as required. State agencies will provide personnel for the SEOC, UAC, and other response and recovery duties when requested.
- IEMA will notify all Primary Agencies of the existence of or potential for a disaster.

Affected local governments are responsible for identifying and communicating response priorities and state resource requirements to the SIRC or through the UAC if it is activated. Through these plans, local governments shall access and utilize all available resources to protect against and cope with an energy disruption. When local governments determine that available resources are not adequate to respond to an energy disruption, they may request assistance from

the state through the IEMA 24 hour-a-day emergency communication center in Springfield. Requests may also come through the IEMA Regional Coordinators. Local governments will have most likely communicated with and requested assistance from private energy providers prior to contacting the state. Energy sector entities such as utilities also may contact the ICC Energy Emergency Coordinator directly if the disruption appears significant, crosses multiple local jurisdictions, and will most likely require immediate state assistance.

The IEMA Director or designee(s) also maintains a constant liaison with the federal government, state agencies, disaster relief organizations, and other states' disaster agencies. A FEMA Operational Liaison(s) in the SIRC will provide the principal means of coordination between the SIRC and FEMA Region V.

### **Mutual Aid Networks**

The [Emergency Management Assistance Compact \(EMAC\)](#) was established in 1996. EMAC is a national disaster relief compact which allows states to provide or receive mutual aid if requested by or from another state and establishes procedures for reciprocity, reimbursement, workers' compensation, and other considerations.

Within the state, Illinois has formed the Mutual Aid Response Network (MARN), which allows critical components of government to unite with the private sector for the deployment of a clearinghouse of resources needed during emergency response and recovery. MARN is designed to act as a force multiplier between the private sector and law enforcement/public safety to mitigate the impact of critical incidents, including natural disasters and acts of terrorism. The clearinghouses contain resources available from the private sector through Memorandums of Understanding (MOUs) and include reimbursement and terms of use for equipment. The MARN and private utilities often provide equipment, such as transformers, to each other as needed during an emergency. The government will bring to bear those resources such as state responders, police powers, and certain types of sensitive information to strike a balance of equal yet contrasting roles in this partnership. The MARN program emphasizes proactive preparedness, safety, and security through this clearinghouse of existing resources for statewide response. The MARN has a seat at the SIRC.

The state also has three other mutual aid networks which can be called upon in an energy emergency to assist in restoration efforts. These include the [Mutual Aid Box Alarm System – Illinois \(MABAS-IL\)](#) which provides firefighters and equipment to areas in need from a disaster or to fill in gaps left by firefighters leaving their municipality to support disaster response; [Illinois Law Enforcement Alarm System \(ILEAS\)](#) which is the police equivalent to MABAS-IL; and the [Illinois Public Works Mutual Aid Network \(IPWMAN\)](#) which is a mutual aid network of municipal public works including utilities that share equipment and personnel in times of

disaster. Municipalities can contact any of these three organizations for support in restoration efforts.

In October 2011, the Illinois Emergency Management Agency (IEMA) launched a public-private initiative that will strengthen coordination between the state and the private sector during disasters. The Business Emergency Operations Center (BEOC) will enhance communication between the private sector and state emergency management personnel to improve preparedness, response and recovery efforts for major disasters.

The BEOC is an emerging concept in public-private working alliances across the nation as states recognize the integral role that private sector entities play in homeland security and emergency management. The BEOC provides an opportunity to strengthen community resilience and overall preparedness through an integrated emergency operations center approach.

The purpose of the BEOC is not to obtain goods and services, but to harness information available through the private sector and coordinate it with response and recovery actions developed in the SIRC. This collaborative effort among sectors will also improve pre-event planning and preparedness, which ultimately improves response and recovery. Sectors currently represented in the BEOC include: agriculture and food; retail; energy; information technology; postal and shipping; bank and finance; communications; transportation systems; chemical; manufacturing; healthcare and public health; water; security; small business; facilities; and service industry.

The BEOC was activated for the first time during the state's earthquake exercise in November 2011. The scenario of this three-day functional exercise was a 7.7 earthquake in southern Illinois along the New Madrid fault line. The BEOC was staffed by more than 50 private industry representatives, with virtual participation from companies that chose to operate from their in-house crisis management centers.

### **Response and coordination within and between state agencies**

State disaster response operations in the SIRC and in the field are conducted in accordance with the National Incident Management System (NIMS). The IEMA Director is responsible for the overall coordination of response and recovery programs through the implementation of the IEOP as directed by the Governor. The IEMA Director or designee(s) also maintains a constant liaison with the federal government, state agencies, disaster relief organizations, and other states' disaster agencies. The ICC Energy Emergency Assurance Coordinator (EEAC) is responsible for coordinating energy restoration after a disruption and can work directly with local EOCs and private energy providers to assist with restoration efforts. All requests for resources or restoration to the EEAC from other government agencies are coordinated through IEMA using the WebEOC format and forms.

IEMA personnel coordinate the collection of disaster intelligence from state agencies, through the SIRC and UAC. The SIRC is the strategic coordination and management facility for all state response activities for a given emergency. State agency support will be coordinated via the emergency support function annex structure in accordance with the IDMS and NIMS. Implementation of portions of the SEOC and execution of initial actions could occur prior to a Gubernatorial Proclamation of a disaster. State agency Duty Officers and SIRC Liaisons will be notified in accordance with IEMA Communications Center SOPs.

During energy disruptions, the state only steps in when the extent of the restoration is beyond the capacity of local municipalities and private sector emergency response efforts. The IEOP identifies the state agencies responsible for and actions required for the response to energy disruptions from disasters under the guidance of the Illinois Emergency Management Agency Act (20 ILCS 3305(6)(2)b,c and 7 (11)). The Illinois Commerce Commission has been identified in the IEOP as the agency responsible for the restoration of energy to state citizens after an emergency. The ICC's Department of Homeland Security has been tasked with these responsibilities within the ICC. The ICC typically works closely with public utilities, municipal utilities, electrical cooperatives and private energy providers to restore energy resources, coordinating with other state agencies and ensuring the private sector has everything the state can provide to restore energy effectively and safely. The ICC also regulates utilities and intra-state natural gas pipeline safety. For long term monitoring of energy supply, the State Energy Office (SEO) within the Department of Commerce and Economic Opportunity (DCEO) monitors the prices, available supplies, and forecasts for the raw materials the state uses.

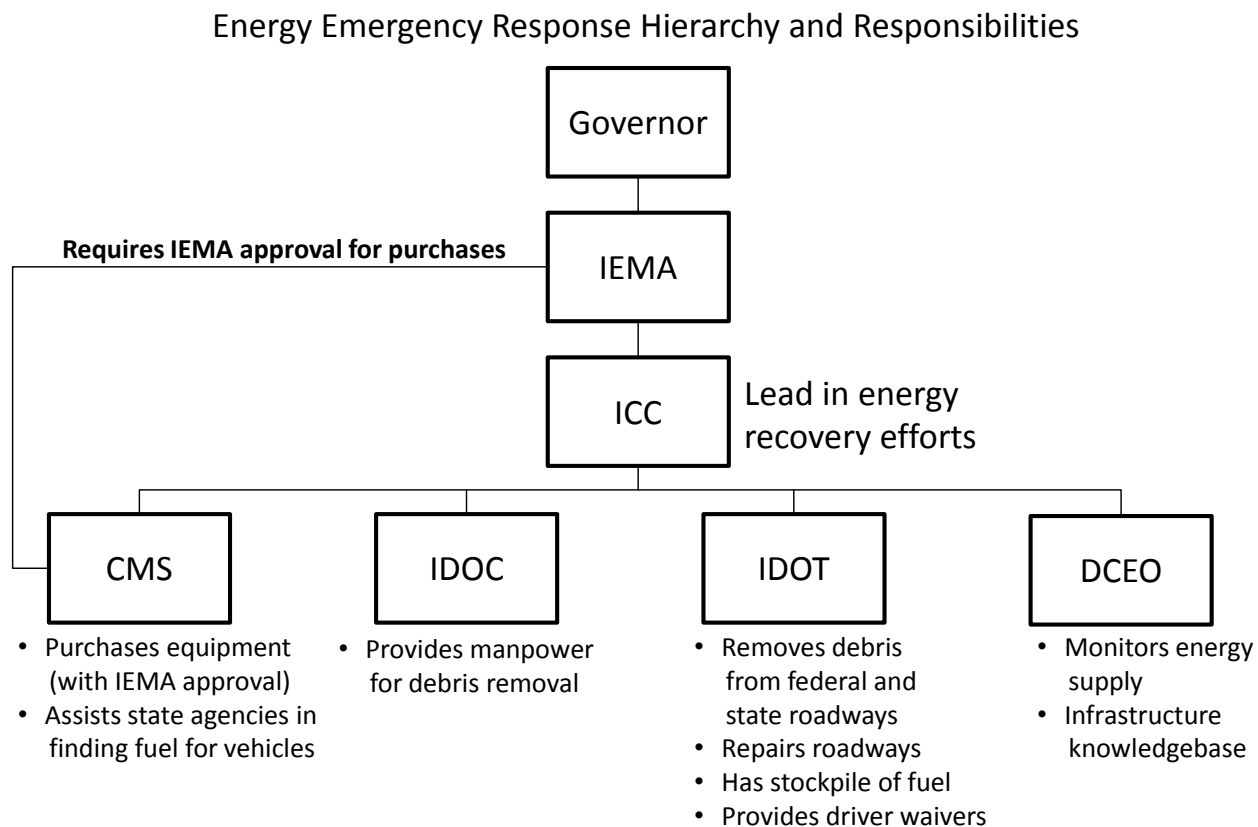
While the ICC is the primary state entity responsible for the restoration of energy after a disaster, the Illinois Department of Commerce and Economic Opportunity (DCEO), the Illinois Department of Transportation (IDOT), Illinois Department of Central Management Services (CMS) and the Illinois Department of Corrections (IDOC) take on secondary responsibility roles. DCEO monitors supplies and pricing, IDOT provides the equipment for removal of debris and road repair, CMS supports IEMA in the procurement of equipment and supplies (including transportation fuels), and IDOC provides manpower for debris removal. Long-term recovery is coordinated with state and federal agencies in accordance with their statutory authorities or, if significant enough, through special task forces established by state and federal officials.

Monthly teleconferences are held between the ICC Department of Homeland Security Representative in charge of energy restoration and energy providers in Illinois to go over any issues, discuss monthly events, and to see if there are any ways the state can help prevent energy disruptions. The ICC Representative has a contact list for all the groups (see Appendix 4) and can contact them quickly in the case of a disruption.

IEMA supervises all emergency response efforts for the State of Illinois according to the IEOP. A section of the IEOP is devoted to the restoration of energy supplies and infrastructure after an

emergency. The Energy Section of the IEOP was added as emergency support function number 12 (ESF-12). According to ESF-12, the ICC is the primary state agency responsible for energy restoration after an emergency, along with the Illinois Department of Transportation (IDOT), the Illinois Department of Central Management Services (CMS), the Illinois Department of Corrections (IDOC) and the Illinois Department of Commerce and Economic Opportunity. IDOT provides the equipment for cleanup and energy restoration and driver hour and maximum weight waivers for utilities requiring personnel to work beyond typical shifts or to carry heavy loads to disaster sites. CMS provides IEMA assistance in procuring supplies and equipment for cleanup and restoration missions, IDOT clears roadways, and IDOC provides the labor required for cleanup after a disaster with their secondary roles and responsibilities (Figure 5). As of the writing of this version of the EAP, efforts are underway to include DCEO with the secondary role of energy supply and infrastructure tracking and situational awareness. In order for this to be approved and included as an official role for DCEO, it must be approved as an official component of the IEOP and ESF-12. The state is currently pursuing the necessary steps for this to occur. In the meantime, a seat within the SIRC has been provided for DCEO's energy assurance engineer.

Figure 5. Energy Emergency Response Hierarchy and Responsibilities



CMS establishes master contracts with the private sector for critical equipment and goods such as generators and fuel. These contracts are established before the disaster and allow the state to access these items quickly during an emergency. They also are typically priced below retail since the state makes an effort to obtain volume purchasing. Municipalities can also have access to these items through joint purchasing contracts established by the state. Any purchasing CMS performs in support of energy restoration must be approved through IEMA by that agency's Finance Officer. CMS has signed contracts with gasoline terminals and gasoline and diesel transportation trucks. In an emergency, CMS can contact these groups and request trucks to transport fuel from these terminals to disaster affected areas to provide fuel for state, local, and private sector disaster responders.

According to the IEOP, the utilities will have first responsibility when restoring electrical and natural gas disruptions. The plan stipulates that the ICC will coordinate with federal, state, and municipal agencies to determine prioritization of energy restorations. ICC, according to the plan, will coordinate damage assessments. The plan notes that the ICC does not have direct authority over municipal utilities and electrical cooperatives but is still expected to supervise their recovery efforts. In past emergencies, the associations for each (IMUA and IECA) have served as go-betweens for the ICC and individual municipal and cooperative utilities affected by disruptions. The associations received aid requests from the utilities and then passed these to ICC for assistance. In discussions with the Illinois Municipal Utilities Association (IMUA) and the Illinois Electrical Cooperatives Association (IECA), both groups indicated that this has happened in past operational emergencies, and they plan to continue to cooperate with ICC as both groups benefit.

The Illinois SEOC holds monthly meetings during which the ICC representative for emergency management is allowed to address any concerns regarding energy assurance. Other state agencies discuss any situations or concerns they may have. CMS, IDOT, DCEO and IDOC have representatives at the table, and the National Weather Service typically gives forecasts for potential weather concerns, reviews weather events from the previous month, and describes responses to those events. IEMA supervises the meeting and also reviews any points of concern, such as impending exercises and situations in the next month that may or will require activation of the SEOC (such as large public events).

### **Consequences and severities of energy emergencies and rate of recovery**

DCEO's Energy Assurance Engineer (EAE) will track the severities and consequences of energy emergencies by reviewing previous emergencies and documenting new emergencies as they occur. The state's tracking process spreadsheet is used for this purpose (see Appendix 2). A

critical question is “At what point does the state become involved?” Local municipalities and utilities can usually recover from smaller emergencies without requiring state assistance. A survey of previous emergencies that required state involvement shows when and at what level the state typically becomes involved; this serves as a guide for future emergencies. A component of the tracking sheet is the rate of recovery for each disruption. The ICC requires utilities to keep extensive records of reliability and post annual self-assessments, as well as provide their own assessments. These reports also address plans the utilities have to improve service. The OE-417 is a document required by the DOE to be filled out when an electrical outage affects a certain number of consumers. Results from OE-417 reports for Illinois utilities have also been logged by the State Energy Office for the past ten years. The State Energy Office has also reviewed historic events where prices and/or supply of raw materials used to produce energy have been at critical levels to try to determine cause and better assist with monitoring for future events.

### **Role of State Energy Emergency Assurance Coordinator**

Within ICC, the Energy Emergency Coordinator (EEAC) or his or her representatives work within the SEOC for energy restoration. His or her role in restoration of energy is primarily to work with the private sector (utilities, pipeline companies, etc.) and ensure they have what they need to restore energy supply. This includes the energy supply required to restore energy (such as diesel for trucks) and long-term plans to restore the infrastructure itself. The Emergency Assurance Coordinator can contact the appropriate state agency representatives at the SEOC (such as the National Guard) to obtain manpower or generators, IDOT to get trucks and equipment for debris removal, CMS to obtain IEMA funds for equipment or supplies, and IDOC to obtain the work force for debris removal. Other tasks performed by the EEAC during an energy emergency include obtaining driver hour or vehicle weight waivers from IDOT for utility and propane truck drivers for additional hours or vehicle weights on the road to deliver propane to rural users in need or to restore electrical infrastructure and obtaining fuel mix waivers from the Illinois or United States Environmental Protection Agency for situations when gasoline blend changes may seriously impact supply and pricing during energy emergencies.

### **Contacts with private sector**

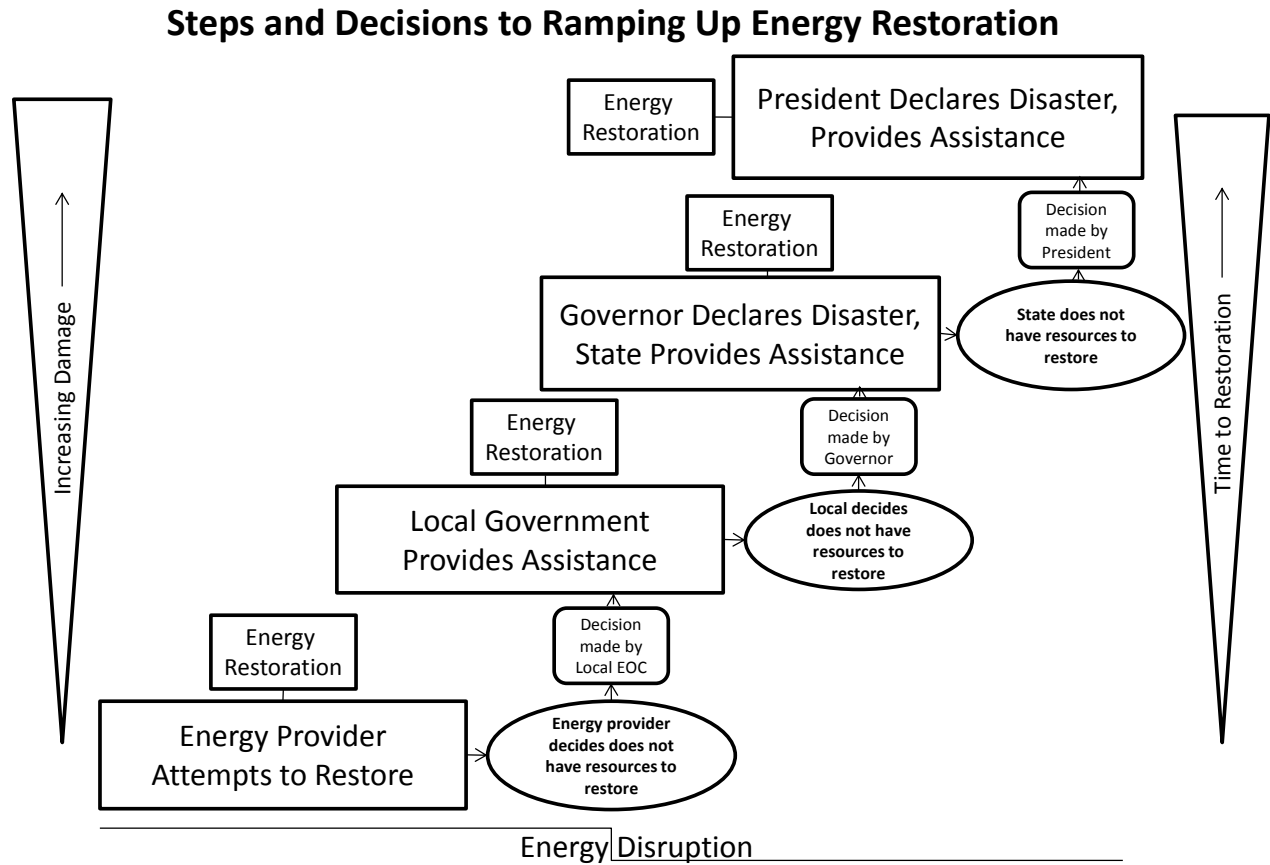
As stated, the ICC EEAC works with the private sector for energy restoration after a disruption. His or her role is to coordinate with the private sector to determine what state assistance they require and to serve as a communication conduit between the state, state agencies, and the private sector to ensure continuity and consistency. The representative has a list of contacts for all private sector entities in Illinois responsible for energy supply and/or delivery and restoration (see Appendix 4). Private sector energy providers make requests directly to the EEAC

regardless of the need in order to avoid confusion. The EEAC will then pass on that request, if appropriate, to another agency.

### **Management decision process**

Whenever there is an energy disruption, the IEMA Communications Center is contacted, whether it is a downed power line or a hazardous material spill from a pipeline. Usually contact is made by an IEMA Regional Coordinator who had been contacted originally by a local emergency response coordinator. The Center will contact the IEMA Director who, if the emergency is energy related, would contact the EEAC. They would make a joint decision, based on experience and guidelines, as to whether the emergency is significant enough for state involvement. Often, the private sector may contact the EEAC to first announce an energy emergency such as downed power lines. But if the private sector restorer is not aware of the situation, the EEAC will contact the entity responsible for restoration of service to ascertain the situation and determine if state assistance is appropriate and necessary. The EEAC then has the authority to 1) take no further action, but monitor the situation for changes, 2) make direct contact with other state agencies or contacts to arrange assistance, or 3) contact IEMA and suggest an activation of the SEOC when the event seems severe. The reaction to a typical energy disruption is as follows (Figure 6): the energy provider is either contacted by the state, local, or their own monitoring system that there is an energy disruption. The provider then assesses the situation and determines if additional assistance is needed. If needed, the energy provider contacts the local government EOC and/or the state EOC (based on severity). When local government becomes involved, the same assessment is made. When the state becomes involved, the Governor is informed and a decision is made. The state may contact FEMA in cases where the disruption is beyond the state's resources. There is some flexibility in these situations, but the correct person needs to be contacted at each step for the next level to be accessed. For instance, in the case of a disruption that is going to obviously require state assistance due to its severity, the energy provider may contact the state directly – rather than going through the local government first – to ensure a rapid response.

FIGURE 6. Steps in Decision to Involve State in Restoration of Energy Disruption



In the case of long-term supply disruptions, the DCEO State Energy Office (SEO) will use the guidelines established in the supply disruption tracking plan (Appendix 1) to monitor energy pricing and supply for potential cost spikes or supply shortages. If there appears to be an impending issue, the Energy Assurance Engineer (EAE) will contact the ICC EEAC who will work with IEMA to determine if the Governor's office should be briefed on the situation. If the situation requires state intervention, the three agencies (DCEO, ICC and IEMA) will work with the Governor's Office to make the appropriate state actions to correct the situation (conservation, price freezing, curtailment, alternative sources, etc.).

### **Responsibility for the identification and assessment of disruptions**

For the purpose of this document the state will separate energy disruptions into two categories: emergency disruptions caused by a disaster in which normally functioning infrastructure is rendered ineffective and energy can no longer be distributed to consumers; and long-term supply disruptions in which the price or availability of raw materials for energy has become an issue for normal, affordable delivery.

Typically, in the situation of emergency energy disruptions, first responders, such as firemen, police, or energy providers themselves, are the first to identify the problem. Both will report the situation to local emergency response or the IEMA hotline, which then reports it to the ICC liaison at the SEOC (Energy Emergency Assurance Coordinator or EEAC). The EEAC will then confirm the extent of the emergency with the private sector entity and the local municipality EOC responsible. Local governments have primary responsibility for response and recovery. The state will only become involved if the situation requires resources beyond those the local government and private sector can provide. The EEAC will work with IEMA and the local EOC to make this decision. The final decision on state commitment of resources, if required, is made by the Governor's Office.

In the case of long-term supply disruptions, the State Energy Assurance Engineer with the DCEO State Energy Office is responsible for monitoring costs and availability of raw materials and energy. The office will use the guidelines established in the Supply Disruption Tracking Plan to monitor energy supply and costs. During an energy emergency which requires SEOC activation, the Energy Assurance Engineer will assist the EEAC in understanding energy supply, infrastructure, and location of resources.

### **Procedures for issuing a declaration**

The Governor's Office is responsible for issuing an emergency declaration, but typically does not do so without IEMA first suggesting it. In the case of an energy disruption, the ICC EEAC will work with IEMA and the Governor's Office to determine if a declaration is required. The final decision will rest with the Governor. IEMA's role is to inform the Governor of the extent of the damage based on reports from local EOCs, at the scene law enforcement, private sector partners, and regional IEMA coordinators.

### **Public information program**

The SIRC and SEOC include staff from IEMA, the primary agencies, and other support agencies as required. They provide strategic and operational coordination for SIRC response activities as well as activities in the field. The SIRC serves as a central source of information on the status of state response activities and helps disseminate information to the Governor, the public, the

General Assembly, Congress, and the media. A Public Information Officer (PIO) will be on duty at the SIRC when activation occurs. This person reports to the Governor's PIO who is responsible for deciding who in the public, private, and government sectors to contact with what information. No one else from the SEOC or state government besides the Governor or a designated PIO should be issuing statements or be contacted during a disruption.

## **Section Three. Individual Energy Source Response Plans**

### **Monitoring system**

The three primary components of the monitoring system for the State of Illinois are field identification of energy disruptions, analysis of disruption predictions, and geospatial monitoring. They encompass all four of the state's major energy sources (petroleum, natural gas, electricity, and renewables).

#### ***Field identification***

Disruptions to energy supplies, especially those from damage to infrastructure, are often discovered by first responders (police or fire), local EOC personnel, or personnel from the energy provider. IEMA provides training for all local EOC personnel and law enforcement on how to identify, report, and respond to energy disruptions. For instance, once turned off, natural gas pipelines should only be turned back on by a trained representative of a gas utility; and, of course, electrical wiring should never be touched unless by those trained to understand and handle the equipment.

Local EOC, first responders, and energy provider personnel are also trained on the proper communication steps to take when an energy disruption is discovered. Criteria for when the state must be contacted in the case of a pipeline leak or a power outage and information on who to contact and how to make that contact is provided. The IEMA Communication Center has a 1-800 number that is manned 24 hours a day for reporting energy emergencies and requesting information.

#### ***Analysis of disruption predictions***

Analysis focuses primarily on monitoring and preparing for energy price increases or supply shortages, a function for which the State Energy Office is responsible. The State Energy Assurance Engineer has access to a number of free and subscription sources listed in the supply disruption tracking plan, as well as a list of contacts (see Appendix 4) within the industry who have agreed to be available to the state if the office should have any questions or concerns. These contacts' livelihoods depend on an accurate assessment of energy prices, and they understand that the state requires this information in times of emergency for restoration efforts.

### ***Geospatial assessments***

The state has developed an energy assurance GIS database (see section five of this plan) which includes the most appropriate layers for monitoring energy infrastructure. IEMA GIS Specialists plan to use the infrastructure layers in exercises and modeling to predict damage and run more realistic scenarios, as well as use the data during actual emergencies to better understand possible outages, areas of impact, and potential damage so they can assist the ICC, IDOT, DCEO and IDOC in restoration efforts. The State Energy Office has worked with DHS Earth and iCAV (Figure 7), but these programs do not allow modeling to predict extent and damage, while other GIS programs do.

Figure 7. Example of iCAv layers for Chicago, Illinois



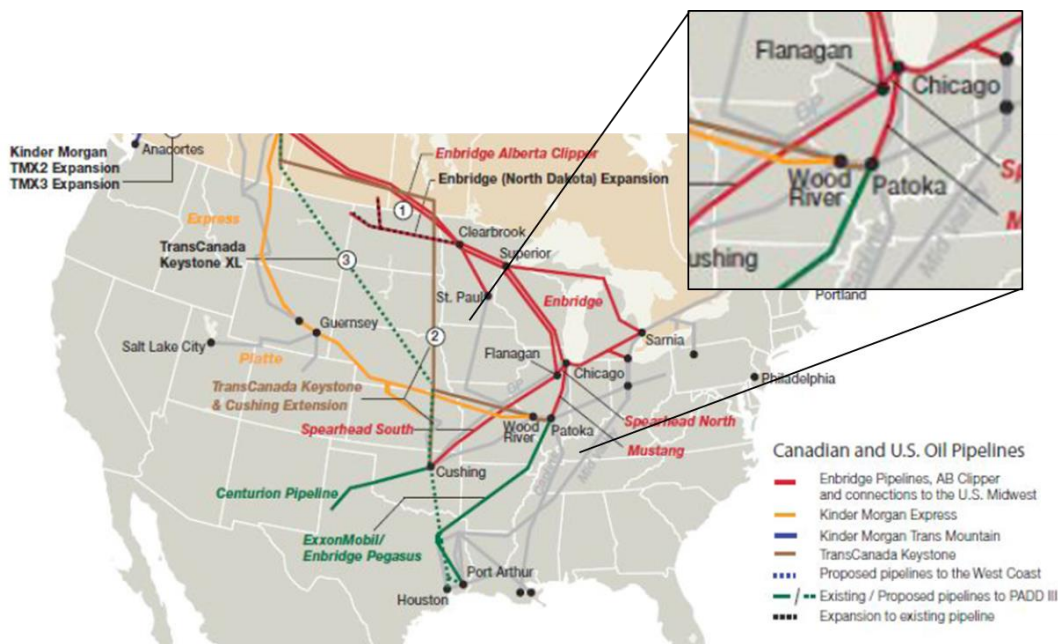
## Petroleum (gas, diesel, heating oil, propane, ethanol, etc.)

### *Description of location, capacity and throughput of infrastructure*

Up until the early 1970s, Illinois was fifth in the nation in petroleum production. It has since tapered off, and in 2010 the state was ranked 14<sup>th</sup>, producing only 759,000 barrels while consuming 254 million barrels a year (4.8 billion gallons of gasoline). As a result, the state imports the vast majority of its petroleum, most of which now comes from Canada through the Enbridge Pipeline.

Petroleum transported into Illinois comes almost exclusively from pipelines. There are two primary types of petroleum pipelines: those that transport the crude oil to facilities where it can be refined into useable products such as gasoline, diesel, propane, and heating oil (refineries), and those that transport the finished product to distribution facilities. A pipeline could be used for both, but this is rare and requires special cleaning. Illinois has a number of petroleum pipelines coming into and out of the state. There are two areas in the state where a number of pipelines converge: in the southern part of the state near Patoka where a large crude oil storage farm exists and is used by multiple companies and along the Illinois border near St. Louis, Missouri (Figure 8). Disasters affecting pipeline flow in these areas could seriously reduce petroleum supplies. Pipeline companies must adhere to National Transportation Safety Board (NTSB) safety guidelines.

Figure 8. Locations Of Major Petroleum Pipelines In Us And Illinois



Petroleum spills are considered hazardous waste, and as such, must be reported to the IEMA Communications Center. Also, the oil spill response section of the Illinois Environmental Protection Act requires anyone owning facilities, a tank or a pipeline which results in a leak to report the leak to the Illinois Environmental Protection Agency. Once a pipeline is shut down for repair or because of a leak it must be re-inspected before it can be turned back on. The Pipeline and Hazardous Materials Safety Administration of the US Department of Transportation must inspect the line before it can be used again. Many, but not all, pipelines have automated pressure valves that detect and report when pressure climbs or descends rapidly indicating a potential spill or pressure build up allowing the company to rapidly locate and repair a leak, but a large leak could impact supply and pipeline leaks often lead to gasoline price increases. It is important for the DCEO Energy Assurance Engineer to be notified of leaks and start monitoring the gasoline prices for spikes which, if significant enough, could be reported to the Governor. On July 24, 2012, the Governor of Michigan, Rick Snyder, declared an energy emergency and waived driver hour limits after a leak in Wisconsin led to a shortage in supply in the upper peninsula of the state.

Illinois has 4 petroleum refineries which process on average 939,000 barrels of oil a day plus a 5<sup>th</sup> facility just across the state line in Whiting, Indiana, which produces 405,000 barrels a day. The Conoco Phillips Refinery near Wood River produces the most at 306,000 barrels a day. The Marathon, Conoco, and BP refineries provide most of the fuel for the state of Illinois. While the media persistently mentions that no new refineries have been built in the U.S. in recent years, refining capacity is in excellent shape and always improving to meet demand. Illinois refinery capacity has actually been above demand recently because of reduced gasoline use during the economic downturn.

95% of the state's gas stations are independently owned. Gasoline goes from the refinery as a "raw" gasoline product (no additives) to a terminal where it is mixed to a gas station's specification. Even though a gas station may be affiliated with Shell or BP, the gas may come from any refinery: it is the additives mixed at the terminal that make it "BP" or "Shell" gasoline. The refineries in the state are using more and more heavy crude from Canada which is now the nation's number one oil provider. Ninety percent of Illinois oil now comes from Canada. Any new state regulations on Canadian crude could impact Illinois petroleum supply. The Conoco Phillips refinery has just added the facilities to take Canadian heavy crude, so all four state refineries can now process that oil. Changes to state regulations regarding this oil type would increase gasoline prices.

As mentioned, the state is transected by a number of petroleum pipelines. Disruption to one pipeline may increase prices and reduce supply, but petroleum for pipelines can often be rerouted. If a shortage from the Gulf (where oil comes in from foreign countries) or Canada occurs, the refineries can compensate to some extent by sending petroleum originating from another location to that pipeline. The biggest concern with petroleum disruption for Illinois is

electrical outages from hurricanes in the Gulf because electricity is needed to pump the petroleum from the Gulf states to Illinois. Most shortages from refinery capacity interruptions or pipeline leaks will be temporary, but a large-scale disaster or multiple problems could result in longer term price hikes. It is important that the energy assurance engineer have the contacts for the refineries available to call quickly to determine capacity and issues at all four refineries and multiple pipelines if one has a problem to ensure re-routes can address the problem.

The state can occasionally help the petroleum industry by providing waivers for gasoline mixes. Large metropolitan areas require different mixes (especially in summer). In the case of a hurricane or a downed refinery, not enough fuel can be mixed for the requirements of the metropolitan areas. The Illinois Petroleum Council (IPC) has served the Illinois refineries in the same capacity as IMUA or IECA has the electrical utilities, by contacting the EPA to request a waiver for multiple refineries. These waivers require the Governor's signature and are only signed during a justifiable petroleum shortage. The DCEO State Energy Office will work proactively with IPC to have the proper communication channels in place to expedite future waiver requests when appropriate.

### ***State emergency response plan***

CMS has contracts in place with several petroleum product terminals and with several gasoline and diesel transportation firms. In an emergency, if transportation fuel is not available at the site of the event, CMS SIRC personnel will contact these contractors and request trucks be sent to key locations identified by the Incident Commander at or near the UAC. The trucks, which will purchase fuel at state petroleum terminals, will serve as re-fueling stations for state, local, and private sector disaster responders. CMS can also provide state gasoline credit cards that can be shared with state personnel (and the private sector in emergencies) and has access to which gasoline stations are open during a disaster event. IDOT also has fuel in storage in case of shortages for their vehicles which they could also share in an emergency event.

### ***Monitoring supply and demand***

Being so closely associated with the price of gasoline, petroleum prices and supply are closely monitored and discussed on a daily basis by major media outlets. Price per barrel is often listed on news programs, and changes in the price of gasoline are commonly listed on [websites](http://gasbuddy.com) such as [gasbuddy.com](http://gasbuddy.com). Sudden increases in the price of gasoline may be a sign that oil supplies have gone down or the potential for disruption exists as this market reacts quickly.

Illinois leads the Midwest in refining petroleum into products (gasoline, diesel, propane, heating oil). The state had an oil reserve of 54 million barrels in 2008. This amount varies by year and is monitored by the energy assurance engineer.

The DOE Energy Information Administration (EIA) [has data](#) on many different components of petroleum supply, sales, and sources including a petroleum status report, pricing reports for gasoline, diesel, heating oil, and propane, and an import report. The EIA publishes a report on first sales of petroleum products directly into [states](#) which could be useful in calibrating new supplies of petroleum coming directly to the state. The EIA also publishes a report on petroleum wholesale and retail prices at the [state level](#). Petroleum inventory and production is also monitored and reported by EIA at [the regional and national](#) level. All of these reports may be used to monitor current supply and use and predict changes in supply and pricing which could be indicative of supply or future shortages. The American Petroleum Institute also provides a [number of sources](#) of information regarding petroleum supplies, gasoline prices, and imports.

Of course, as is the case with other energy supplies, contact with industry is essential. Existing industry contacts such as the Illinois Petroleum Council and the refineries themselves should be contacted by the energy assurance engineer if a disruption seems to be looming.

Understanding the impacts of weather on heating oil and propane sales and prices and understanding peak gasoline use periods can also help when monitoring demand for petroleum products. Long cold spells may lower heating oil supplies and peak summer vacation and holiday travel periods may lower gasoline supplies. When combined with a disruption, the effect from these situations on energy assurance will be more extreme.

The EIA [publishes a list of operable refineries](#) that can be used to determine where oil is being converted to gasoline, diesel, propane, and heating oil. Oil pipeline information is available from iCAV and DHS Earth (Figure 7). Illinois is a major transportation hub for crude oil. Several crude oil pipelines terminate in Illinois making this a point of concern for disruptions to petroleum supplies not only in Illinois but surrounding states.

### ***State efforts to reduce consumption and provide alternate energy sources***

Illinois, often first or second nationally in corn and soybean production, is a good location for the production of corn ethanol and soy bio-diesel. Current ethanol production in Illinois is greater than 860 million gallons per year. Plants often keep ethanol in storage at the facility. Illinois River Energy, for example, reports keeping 300,000 gallons of ethanol in reserve at all times. The Governor of Illinois has the authority to suspend the blend wall (the percent of ethanol to be added to gasoline) in times of emergency, allowing for more ethanol to be used in replacement of gasoline for fuel. Use of increased blends of ethanol can offset the use of conventional gasoline. In the event of a petroleum product supply emergency, Illinois could request a fuel waiver from EPA to temporarily grant approval of statewide use of E15 (15% ethanol blend) for use in all conventional vehicles. (The blend is currently at 10% for most Illinois gasoline.) This could make ethanol a viable alternative to gasoline in times of emergency, but the U.S. EPA would

also have to approve, and the ability of car engines to handle the fuel would have to be understood. Also, ethanol, while stored at the production facility, may already be committed to customers, making it difficult for the state to access. The state is considering encouraging the development and deployment of blender pump infrastructure to allow widespread distribution of E15, E20, E30, E40, and E85. Currently only 6 percent of the 4,400 retail fueling stations in Illinois are E85 stations, and only 2 have blender pumps.

The state also encourages citizens to voluntarily reduce gasoline consumption by using public transportation, bicycling, or car pooling. IDOT has a [webpage](#) dedicated to bicycle use, safety, and routes and has funding for the development of bicycle routes; it also has a [webpage](#) promoting and encouraging the use of Amtrak. The Governor has created a [web page](#) for people to connect for carpooling to work. The state has [incentives](#) for electric vehicles for car sharing organizations and alternative fuel vehicle and alternative fuel rebates as part of the Illinois Green Fleets Program. IDOT has conserved fuel in the past during high gasoline prices by reducing the number of times they mow interstate and state highway right of ways.

### ***Legislative actions to assist in restoration, supply and pricing***

#### **Driver hour waivers**

IDOT is responsible for issuing driver hour waivers for propane and petroleum truck drivers during inclement weather to ensure rural residential customers receive propane for heating fuel and gasoline stations receive fuel. The waiver must be approved by the Governor. The [National Propane Gas Association](#) posts the current status of driver hour waivers in each state. Waivers are often granted in the winter. The State Energy Office will assist IDOT and the Governor's office in understanding propane supplies, petroleum supplies, weather, and the need to allow the waivers.

#### **Fuel specification waivers**

The U.S. EPA can grant fuel waivers in a gasoline or diesel supply emergency. Two areas in Illinois have requirements for reformulated gasoline (RFG): the Chicago area and the Metro-East (near St Louis) area. In emergency situations, the U.S. EPA has the authority to grant waivers for the RFG requirement and allow the use of conventional gasoline instead. U.S. EPA can also consider, on a case-by-case basis, allowing higher blends of corn ethanol or higher sulfur diesel fuel. In both cases, engine warranties and life-time will impact the consideration of granting such a waiver. EPA's Office of Enforcement and Compliance Assurance (OECA) should be contacted in this case at (303) 312-7153.

During this process, the Illinois EPA serves as an advisor to the U.S. EPA and the OECA. Therefore, in any emergency situation, the Illinois EPA should be contacted. Ultimately fuel waivers are granted by the U.S. EPA. In the case of an RFG waiver by the U.S. EPA, the Illinois EPA's volatility standards for Metro East will still need to be waived. However, this standard is expected to be discontinued.

Finally, in case of a fuel waiver, Jonelle Brent with Illinois Department of Agriculture, Weights, and Measures Department (217) 785-8300 will need to be contacted as her office ensures that all fuels meet the stated blending limits. The Illinois Department of Agriculture will be in close contact with the Illinois EPA in case of an emergency situation.

The state has legislation in place that requires state agencies to purchase Flex Fuel Vehicles (FFVs); additionally FFVs account for more than 300,000 registered vehicles in state. FFVs can use higher blends of ethanol (up to 85%).

Finally, if a disaster is declared, the Governor does have the right to 1) freeze prices of petroleum products to prevent rapid increases in a shortage 2) prosecute price gouging if proven 3) acquire petroleum products to be used in an emergency from private sector providers. While it is hoped these never have to happen, it is critical the energy assurance engineer understand supply, potential impact of disruptions and price increases to best inform the Governor.

## **Natural gas**

### ***Description of location, capacity, and throughput of natural gas infrastructure***

Only 51 operating natural gas wells produce natural gas in Illinois, but the state is a major transportation hub for the natural gas supply moving through North America. Major natural gas pipeline systems from the U.S. Gulf Coast, U.S. midcontinent regions, and western Canada converge at the Chicago Hub and the ANR Joliet Hub. From there, natural gas is transported to consumption markets in the Midwest and Northeast. In June 2009, a section of the eastern leg of the Rockies Express Pipeline system from Colorado and Wyoming began delivering additional natural gas supplies to Illinois increasing supply further. To meet peak demand during the winter, Illinois stores natural gas in natural aquifers and depleted oil or natural gas reservoirs. Underground natural gas storage capacity in Illinois is second only to that of Michigan. The residential sector leads natural gas consumption in Illinois, with more than four-fifths of Illinois households relying on the fuel as their primary energy source for home heating.

ICC is responsible for monitoring intrastate natural gas pipelines following federal guidelines closely. ICC is only contacted by the pipeline company if there is a leak, rather than a disruption, and then only when the leak is significant. Also, ICC only monitors natural gas. The federal government monitors petroleum and other hazardous liquids. Intrastate pipelines cannot

be turned back on until inspected by ICC and require inspection from the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA). If there is a shut-down because of an earthquake or other possible damage, the pipeline cannot be used again until ICC or PHMSA signs off on it. In the case of a disruption or a shortage, the utility decides which customers to shut off. Typically, businesses are shut off first. ICC and PHMSA do have the authority to issue an emergency special permit to get a pipeline turned back on without inspection, but this requires both to sign. All pipeline regulations came from federal regulations put into place in 1970. Each year amendments to the 1970 act are added based on incidents with a death and/or property damage exceeding \$50,000. Pipeline operators are responsible for keeping records of pipeline distribution, age, materials transported, etc. Older pipelines are galvanized iron and steel. Newer pipelines are PVC and more resilient. Most pipelines have PSI meters and automated monitoring. ICC and PHMSA perform reliability studies on pipelines and occasionally shut them down if they are below standards.

The utilities own storage facilities and store natural gas at the beginning of each winter, but they do not own the supply coming into the state in pipelines, most of which is committed to East Coast states. It would be difficult for Illinois utilities to gain access to that natural gas. A common mis-conception for natural gas pipelines is that flow slows down in the summer. According to the natural gas companies, flow is pretty steady throughout the year, as summer months are used to replenish storage for winter.

### ***Monitoring supply and demand***

Over 80% of the state's households rely on natural gas for home heating, and home heating is the primary use of natural gas in Illinois. The natural gas market is more difficult to monitor than petroleum. However, there are some helpful tools available. The EIA publishes a [monthly report on natural gas inventories and deliveries](#) to industrial, commercial, and residential customers, on withdrawals from underground storage, and on pricing. This information is compared to previous years and 4-month averages and can be used to identify trends in price and use. Also, according to the National Association of State Energy Officials (NASEO) Energy Assurance Guidelines, we can monitor changes in natural gas supply by looking at two other indicators: spot and contract prices and curtailment notices. Curtailment, which involves requests by the natural gas supplier to reduce use, are very rare. If sent, they are usually sent to large users such as industry as opposed to homeowners. Weather will also need to be watched as long-term cold spells may reduce supplies. To meet peak demand in the winter, the state stores natural gas in natural aquifers and depleted oil and natural gas reservoirs, but a disruption in a pipeline or accidental release of this gas could cause a shortage. While the State Energy Assurance Engineer monitors weather daily for a variety of reasons, s/he will watch specifically for a prolonged cold spell late in the winter when supplies may be low and then work with the natural gas companies to suggest reduced use to the public to avoid curtailment requests. If

utilities and analysis indicate supplies are getting low, the state may request that citizens reduce use. This will be done via a press release from the Governor's office.

The ICC publishes an [annual report](#) that lists the natural gas providers in the state of Illinois (11 as of 2009) and divides it by region and lists costs to consumers. Contacts exist with the natural gas industry personnel for each of these 11 companies, and they are usually more than happy to share information on supplies and in-state demand.

The previously mentioned ICC report offers information on companies that distribute and sell natural gas by region in the state of Illinois. Natural gas pipelines, similar to petroleum pipelines are also available for viewing from iCAV and part of the Illinois Energy Assurance GIS database. Similar to petroleum, Illinois is a major transportation hub for natural gas. Several natural gas pipeline systems converge at Chicago, including systems from the Gulf Coast, western Canada, and just starting in 2009, a pipeline from Colorado and Wyoming.

## **Electricity and electricity energy sources**

### ***Infrastructure description***

Between large coal reserves and an active nuclear generating industry, Illinois seems to have ample materials for electricity generation. However, although the state's estimated recoverable coal reserves represent more than one-tenth of the U.S. total, only a small fraction of those reserves are located at producing mines. Illinois does not rank among the nation's top coal producers, due in part to unfavorable geologic conditions and surface development, such as towns and roads and in part to the fact that Illinois high-sulfur coal is less attractive to electric utilities than western low-sulfur coals. Illinois delivers more than one-half of its coal output to other states, including Indiana, Tennessee, Florida, and Missouri. Illinois also receives coal from other states, particularly Wyoming, and uses that coal to generate electricity. Most of this coal is shipped into the state via rail. Much of the coal leaving the state is sent via rail or barges down the Mississippi River.

In addition, many coal plants could be closing down when new environmental regulations go into place in 2015. Right now, two coal generating plants in Chicago owned by Midwest Generation are planned for closure constituting just under 1,000 megawatts production. Two other older coal plants could be closed down also by the company as well. Both of these are also in Chicago. This is a very small percentage of the overall production but other plants could lead to increased electricity prices. [Midwest Generation](#) is building a new plant in Chicago, and several new plants are proposed in Illinois which will meet the stricter guidelines along with several smaller natural gas plants, but the energy assurance engineer should monitor sites like [SourceWatch](#) to estimate the number of megawatts leaving and entering production. If plant closing reduce the overall available electricity or require more expensive fuels, the cost of

electricity could go up. This is being predicted for the 2015 closings by some analysts, as other states will also be closing plants and electricity can be sold across state lines. Also, a combination of plant closings and an emergency may lead to brownouts or blackouts if the grid cannot meet demand.

Currently, Illinois is one of the top electricity-generating states in the nation and a leading net exporter of electricity to other states. Coal and nuclear power generate over 95% of the electricity in Illinois, with a near even split between the two fuels. With 11 operating reactors at 6 nuclear power plants, Illinois ranks first among the states in nuclear generation and generates more than one-tenth of all the nuclear power in the United States. The growth of the Illinois nuclear industry is due largely to state government initiatives, which began encouraging nuclear power development in the 1950s. One issue is that most of these plants were designed to operate for 30 years and were built in the 1970s. However, IEMA and the state take rigorous steps to ensure the nuclear power generating facilities stay safe. This is an active 24/7/365 operation with a control room at State Emergency Operations Center that constantly monitors all the plants. They also train three times a year with various disaster scenarios. The nuclear plants all run at 100% capacity year-round. There are no plans for additional plants to be built, but these plants consistently increase capacity and efficiency. Despite their 30-year life span, the plants have been applying for and receiving extensions based on their safety record and continuous infrastructure updates and monitoring.

Besides concerns over radiation, nuclear plants must monitor the temperature of their cooling lakes; if they rise over a certain temperature in summer months, the facility has to cut back production to avoid fish kills. This rarely happens, but could be monitored and predicted with weather data. An additional problem is that when the grid is shut off, the nuclear facility has to shut off and then restart. It cannot function separately from the grid as it would have no place to send generated electricity, and the backup diesel power generation is insufficient to power the plant. Nuclear facilities have no “black start” capabilities.

Wholesale electricity marketers such as PJM and MISO sell the electricity to utilities such as ComEd and Ameren which then distribute the electricity to businesses and residences. These companies monitor the electric grid (generating plants, transmission lines, etc.) very carefully to ensure electricity keeps flowing without interruption. The monitoring system uses multiple control rooms that watch the grid for problems and let the utility companies know what needs to be repaired. They call the generating plants and tell them what capacity to operate at each day and make infrastructure improvement and resiliency plans each year, which they submit to the utilities and which generally are implemented. They monitor the price of supplies such as coal and natural gas, including monitoring days of supply and long-term use, as well as monitoring and modeling weather to anticipate increases in demand. These companies try to manage the electricity generated with consumer needs. Generating electricity that is not used costs the companies money so they try to anticipate needs and generate accordingly. They have assured

energy assurance personnel that the grid in Illinois has built in redundancy and strong resiliency, but have also told the state they will contact state personnel if the load challenges capacity. They put out annual reports that summarize this information which are available to the state and public. Finally, these companies have detailed cyber-security plans in place.

The state has limited control over electricity rates. They can control the price utilities charge to transport electricity and natural gas and to maintain the infrastructure (wires and pipes, which are less than half the cost to the consumer), but they do not control the cost of the energy itself. The state cannot tell utilities to build new generating facilities. Essentially, the state cannot regulate the cost of electricity or the amount that is generated in Illinois. For municipalities that handle their own electricity, the state has even less control. If the wholesale distributors were to increase prices the only alternative consumers would have would be to reduce use. However, NERC and FERC could get involved, and the state could work with the wholesalers and utilities to find ways to reduce costs.

In August 2007, Illinois adopted a statewide renewable energy standard requiring the state's utilities to produce at least 25% of their power from renewable sources by 2025. 75% of the electricity used to meet the renewable standard must come from wind; other eligible sources include solar, biomass, and existing hydroelectric power. The law also includes an energy efficiency portfolio standard that requires utilities to implement cost-effective energy efficiency measures to reduce electric usage by 2% by 2015.

### ***Monitoring supply and demand***

All electrical sales are reported to the EIA including sales of electricity generated from renewable energy at the state level for biomass, wind, geothermal, and solar by state. The site also gives information on sources for electricity generation by state, which allows the tracking of use of specific energy sources (such as coal and natural gas) and the monitoring for reduced supplies of the raw materials for electrical generation. The EIA publishes a [quarterly coal price and inventory report](#) which allows monitoring of coal supplies, availability, and use, including the number of in-state days of supply. Illinois has large coal reserves, but the coal is high in sulfur and must be mixed before combustion with low sulfur coal from the western U.S. (primarily Wyoming) to meet regulations.

Other data provided by EIA for electricity supply includes an annual inventory of power plants in the United States. While the publication has been discontinued, it contains historical data on electrical generation by state and by energy source for gas, coal, petroleum, and hydroelectric.

The U.S. EPA's Emissions and Generation Resource Integrated Database (eGRID) also produces a database which contains all electricity generating plants, their net generation of energy by source by year (coal, nuclear, biomass etc.), and the plant's location including latitude and

longitude coordinates which will allow for input into a geographic information system for mapping purposes. Transmission lines, power stations, and other electrical grid information are available for viewing on the iCAV and DHS Earth sites as well.

Other useful information for tracking potential electricity demand includes weather information, available online from a number of sources. Long-term forecasts of high summer or low winter temperatures may indicate increases in demand.

Specific to Illinois, the ICC publishes reports on electrical sales by year broken out by company, price, and user (retailer, commercial, public, etc.) for the state. The data is divided by region and could give insight into regional use and demand.

Because such a high percentage of Illinois' electrical energy is produced using nuclear power, this will require special attention. Neither the source of nuclear power generation nor its price is expected to be an issue, but other factors, such as reactor failure or terrorism need to be considered. Illinois has 6 nuclear facilities with 11 reactors.

### ***State efforts to reduce consumption, alternate energy sources for natural gas and electricity***

#### **Renewables**

The two primary components of Illinois's renewable energy portfolio are electricity, from wind and solar power, and bio-fuels for transportation from ethanol (primarily from corn) and bio-diesel (primarily from soybeans). EIA reports minimal use of hydro-electricity in Illinois. Table 1 indicates that in 2010, just over 4% of the state's total energy was provided by renewable sources for electricity, and, in 2010, 2,112 megawatts were generated from renewables. Illinois' renewable energy standard requires the state's utilities produce 25% of their electricity from renewable sources by 2025. Much of this is expected to come from wind.

The site [www.windpoweringamerica.gov](http://www.windpoweringamerica.gov) offers information on potential wind power generation [in Illinois](#). This site estimates close to 250,000 megawatts of electricity could be generated from wind energy in Illinois. The American Wind Energy Association shows current [wind projects by state, county, and even by project](#) with megawatt potential for each project.

#### **Combined heat and power**

Combined Heat and Power (CHP) systems have the capability, under certain configurations, to continue to safely operate and provide electric service to a facility during emergency situations (extended electric utility outages). In Illinois there are currently 138 CHP systems operating with a total installed capacity of 1,360 MW (see Table 9 below). The US Department of Energy

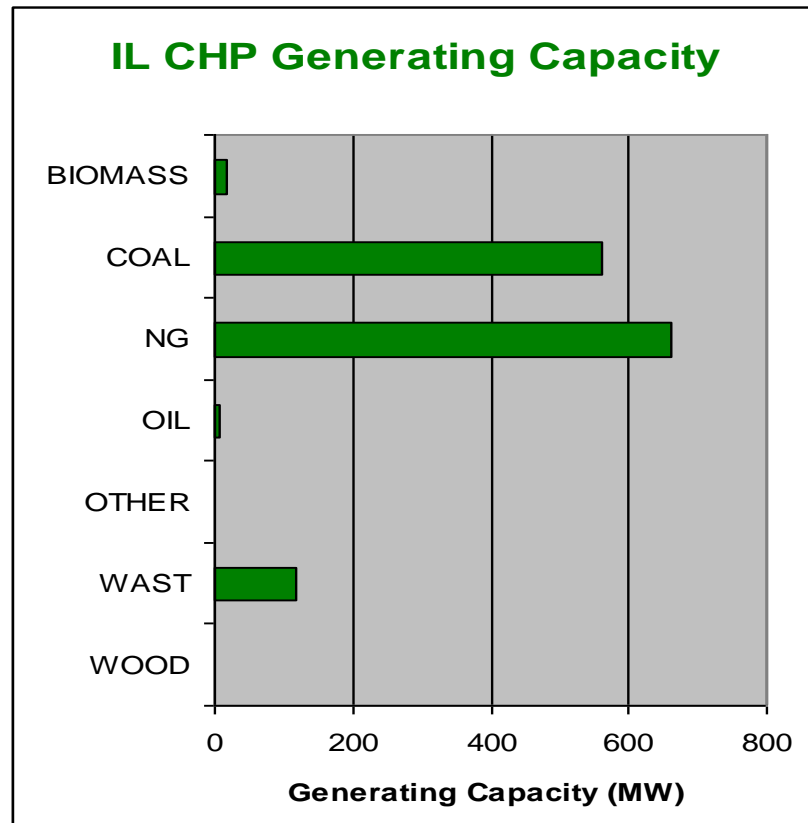
estimates that the total CHP potential for the state is between 3,000 MW and 8,000 MW from fossil fuel sources. The Midwest Clean Technology Application Center estimates that an additional 3,000 MW could come from agricultural sources (farm digesters, corn stover gasifiers integrated with CHP systems). The majority of the CHP systems installed in Illinois are equipped with black start capabilities and synchronous generators, which allows the CHP system to serve the facilities' load in case the electricity grid de-energizes.

TABLE 9. Installed CHP Systems in Illinois

A.E. Staley Manufacturing Co.	John Deere Harvester Works
Archer Daniels Midland Company	Kelly-Springfield Tire Company
BP Amoco Chemicals Company	M&M Mars, Inc.
Brookfield Zoo	Museum of Science & Industry
Caterpillar Manufacturing	Quaker Oats Company
Equity Office Properties	Shell Oil Company
Evanston Township	U.S. Navy, U.S. Army
ExxonMobil Corp	US Steel
Fleishmann Kurt Matt Co.	Warner-Lambert Company
General Mills, Inc.	Wells Manufacturing Co.
Goose Island Brewery	Colleges/Universities (17)
Hunter Haven Dairy	Hospitals (12)
Ingersoll Milling Co.	Schools (21)
IRE Ethanol Plant	Wastewater Treatment Plants (7)

The diversity of the fuel sources for CHP systems in Illinois is illustrated in Figure 8 below. As can be seen, either a natural gas or coal shortage would only affect a portion of the installed capacity, allowing the remainder to operate.

Figure 9. Diversity of CHP Fuel Supply



The Midwest Clean Technology Application Center closely monitors the supply diversity from CHP and total CHP potential for the State of Illinois.

### Reduced use

There are several programs the state has developed to encourage consumers to reduce energy usage and cut energy costs for household or business. Below are some of the programs designed to help consumers reduce energy use and costs by eliminating energy loss and increase efficiency.

- [Ameren Illinois Act On Energy](#)
- [Anybody Can Serve](#)
- [Center for Neighborhood Technologies](#)
- [ComEd - Home Savings](#)
- [Illinois Home Weatherization Assistance Program](#)
- [KeepCool.Illinois.gov](#)
- [KeepWarm.Illinois.gov](#)

## Smart grid role

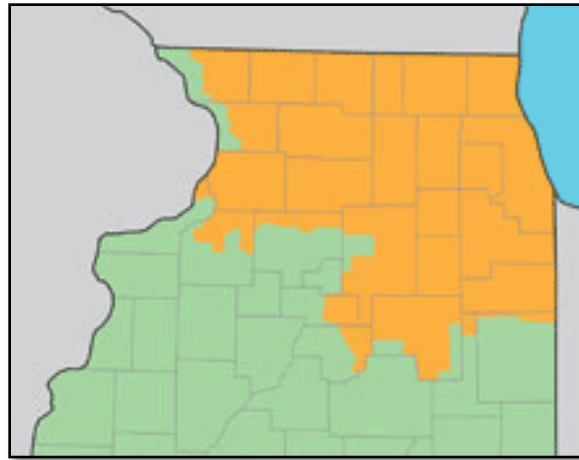
Smart grid technology encompasses a number of mechanisms that allow for better monitoring and delivering of electricity. Unlike natural gas or petroleum products, electricity cannot be stored effectively in any large quantities. This requires electricity providers to produce the maximum amount of potential electricity which may be required at any given time to avoid brown-outs or blackouts. The smart grid 1) allows utilities to continuously monitor for outages and identify problems before they lead to outages, 2) allows for a feedback loop between electricity generators and consumers to allow (to some extent) electrical generation to be increased or decreased based on demand, 3) better allows for the implementation of wind and solar power which, because of their intermittent contributions, offer new problems to a grid which is used to continuous electrical flows.

The ICC has developed a [Statewide Smart Grid Collaborative Report](#) which addresses the potential for smart grid technologies in Illinois. Two important components of the smart grid identified in the report were 1) smart meters for residential customers, allowing customized delivery of electricity based on use and providing the utility detailed usage data to monitor and respond to; and 2) synchro phasers, which allow continuous measurements of electrical flow along the grid for wholesalers to measure, monitor, and adjust output from generating facilities.

Recently, the Illinois legislature passed HB 3036, allowing Ameren Illinois and Commonwealth Edison (ComEd) to implement smart grid technology for their portions of the Illinois electrical power grid. The bill, which had a previous version vetoed by the Governor, was somewhat controversial as some saw it increasing electrical costs to consumers without assured cost savings. It also went around the traditional method of rate increases occurring through the ICC by asking for a flat increase to consumer utility bills to be directly implemented by the legislature.

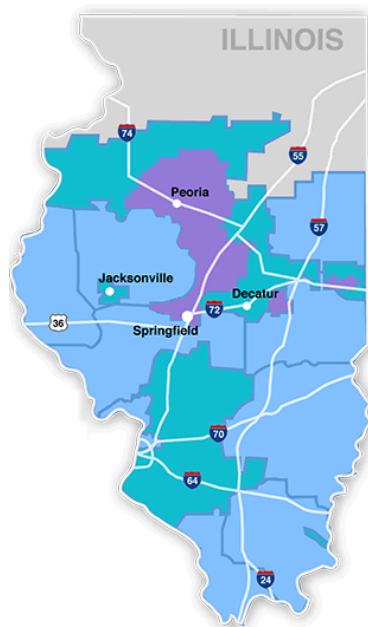
ComEd has begun their \$2.6 billion upgrade to the electrical grid they estimate will take 10 years to implement. An analysis performed by an independent firm for ComEd estimates the cost savings from the advance metering initiative (AMI) component of their smart grid upgrade would provide \$2.8 billion in savings over 20 years and improve electrical reliability (the AMI component of ComEd's smart grid plans is estimated to cost \$1.8 billion). According to ComEd, half of the cost is going to upgrade the physical components of their electrical system (new wiring, transformers, etc) that spans northern Illinois (Figure 10). The other half is going toward the communications network that will be required in order for the smart grid to communicate detailed information regarding consumer use and the health of the electrical grid. The cost to consumers is \$3 a month.

Figure 10. ComEd Electrical Services Territory in Northern Illinois in Orange



Ameren's plans for smart grid upgrades include sensors placed along critical sections of the transmission grid to monitor conditions and prevent disturbances elsewhere from cascading into Ameren territories (Figure 11). It will also assist in the incorporation of wind and solar power. Ameren's sub-stations will be upgraded to allow remote operation of switches and monitoring for outages, that would allow the utility to switch to alternative power sources and avoid outages. Ameren will put mointors in place at the distribution grid level to allow for remote switching to alternative power sources and to switch the flow of power to avoid damaged areas.

Figure 11. Ameren Electrical Services Territory In Illinois



## **Cyber-security**

All Illinois electrical wholesale (PJM and MISO) and utilities (Ameren and ComEd) have been required by the Illinois Public Utilities Act to provide to the ICC a plan for cyber-security. ICC has information technology personnel who specialize in cyber-security issues review the plans and work with the utilities. These personnel are available to work with the SEOC if there is a breach. If ICC feels the plan of any utility or electricity wholesaler is not sufficient to protect the public safety, they can request the utility enhance measures. The plans closely follow NERC Critical Infrastructure Protection (CIP) Guidelines as NERC has also asked for similar plans and does exercise these plans. NERC has established a number of [CIP standards](#) that address cyber-security, and utility and wholesaler plans closely follow and address each standard. Standards and sub-standards 2 thru 9 specifically address cyber-security. Critical components of the NERC standards that ICC emphasized were the development of more than one security perimeter (multi-layered security protections), and the identification and vulnerability assessment of critical assets (control centers). All Illinois utilities and wholesalers run their own exercises to test their systems.

A primary concern identified with smart grid technology is that by nature, the communication between the grid and the utility opens new vulnerabilities. Others may be able to access these communication pathways and cause areas of the grid to shut down or switch electricity routes, causing overloads. Multiple vendors are involved in the development of all components (hardware and software at control room and in field). Ameren and ComEd were required to submit detailed cyber-security plans for approval to ICC for the recently passed smart grid plans and are working closely with vendors to ensure these pathways are secure, compatible, and reliable. Each utility is requiring vendors to meet the NERC CIP standards. NERC has also been performing cyber-security exercises with Illinois wholesalers and utilities.

A major issue associated with cyber-security and the petroleum, natural gas and pipeline industries is the impact a cyber-attack could have on the SCADA systems which run much of the automated processes. Discussions with the Illinois industries have led to assurances that most SCADA devices are in closed environments and most control rooms have no access to the internet making a cyber-attack very difficult. Personnel from many of the energy sector companies in Illinois have met with the state regarding cyber-security and reporting breaches. While they are not required to do so, most companies have told the state, they will report any issues.

## **Section Four. Critical Infrastructure Plan**

### **State plan for enhancing resiliency and protecting critical infrastructure**

The Illinois Emergency Management Agency (IEMA) is the state agency responsible for coordinating disaster and emergency preparedness. The IEMA, through the Illinois Terrorism Task Force (ITTF), develops and implements the state's homeland security strategy and administers federal preparedness funding. The Illinois Private Sector Alliance Project (PSAP) was launched in 2007 to integrate the business and nongovernmental sectors with government efforts in preventing, responding to, and recovering from catastrophic events. The PSAP exists under the ITTF and consists of two programs: the Infrastructure Security Awareness (ISA) Program and the Mutual Aid Response and Resource Network (MARN). The State of Illinois does not have a state-level critical infrastructure plan in place at this time but is investigating ways to develop one.

For the purposes of energy assurance, the state was divided into each IEMA region and its energy infrastructure (natural gas and petroleum pipelines, electrical transmission lines, refinery locations, electrical generating plants, wind farms) was mapped. The following is a breakdown of each region and the associated critical energy infrastructure. This plan has been disseminated to each IEMA Regional Coordinator, the Illinois Terrorism Task Force, and the Illinois State Police to assist them in their efforts to protect and respond to impacts to these infrastructure components.

Figure 12. Legend for Energy Infrastructure by IEMA Region

## Petroleum Facilities

● <all other values>

## FACTYPE

- Chemical plant
- Distribution/receiving terminal
- Ethanol plant
- Gas processing plant
- LPG fractionator
- Meter station
- Pump station
- Refinery
- Storage/tank farm/terminal
- Truck unloading facility
- Underground storage

## Power Plants Capacity (Mwh)

### NAME\_CAP

- ▬ 0 to 500
- ▬ 500 to 1,000
- ▬ 1,000 to 2,000
- ▬ 2,000 to 2,650

## Natural Gas Pipelines

## DIAMETER

- 0 to 5 in.
- 6 to 14 in.
- 15 to 26 in.
- 27 to 42 in.

## Petroleum Pipelines

## DIAMETER

- 0.000000 - 4.000000
- 4.000001 - 14.000000
- 14.000001 - 26.000000
- 26.000001 - 42.000000

## Transmission Lines

## VOLTAGE

- 0.000000 - 191.250000
- 191.250001 - 382.500000
- 382.500001 - 573.750000
- 573.750001 - 765.000000

## Utility

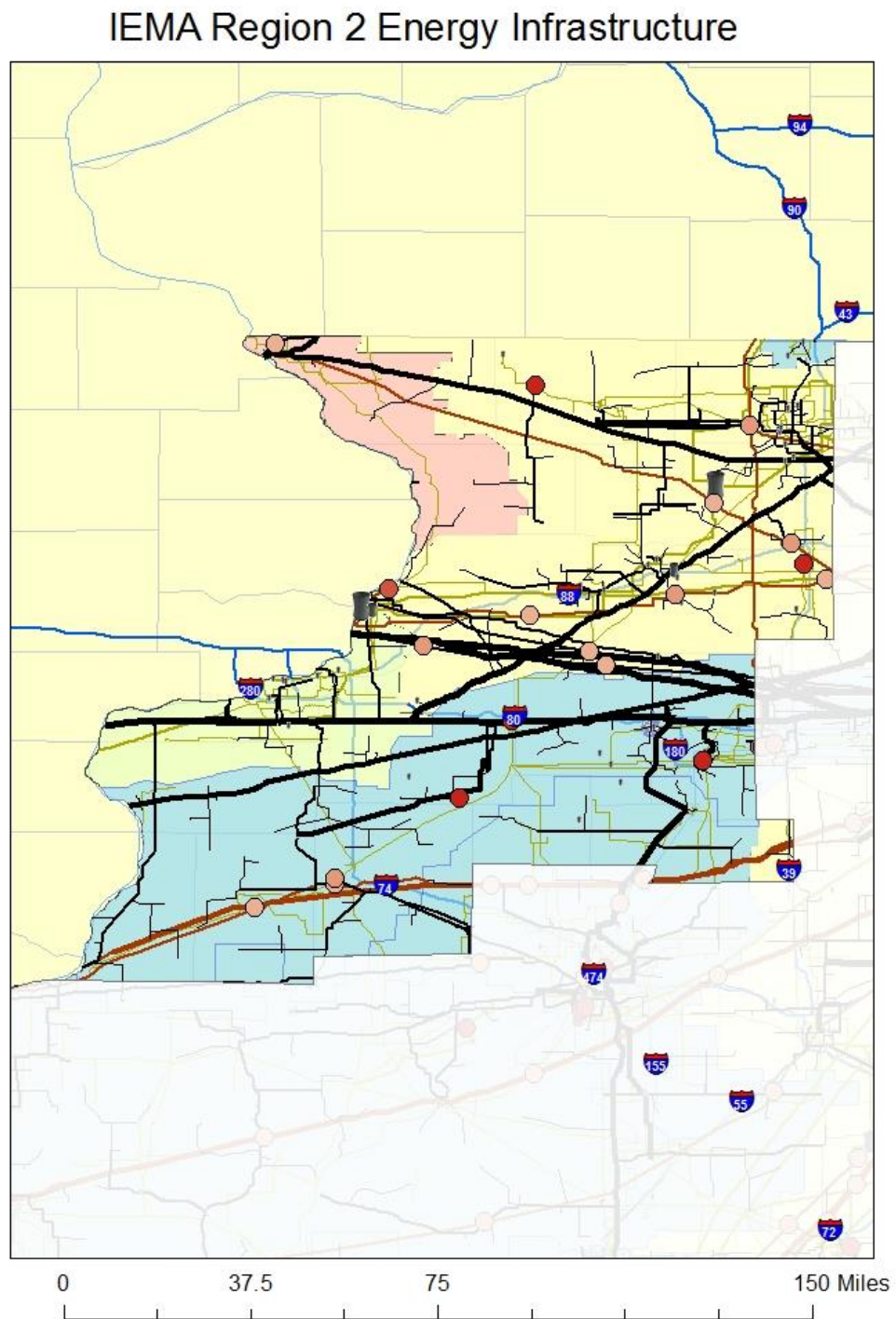
□ <all other values>

## OPERATOR

- Ameren Illinois Company
- AmerenUE
- Commonwealth Edison Co.
- Interstate Power and Light Co.
- MidAmerican Energy Co.

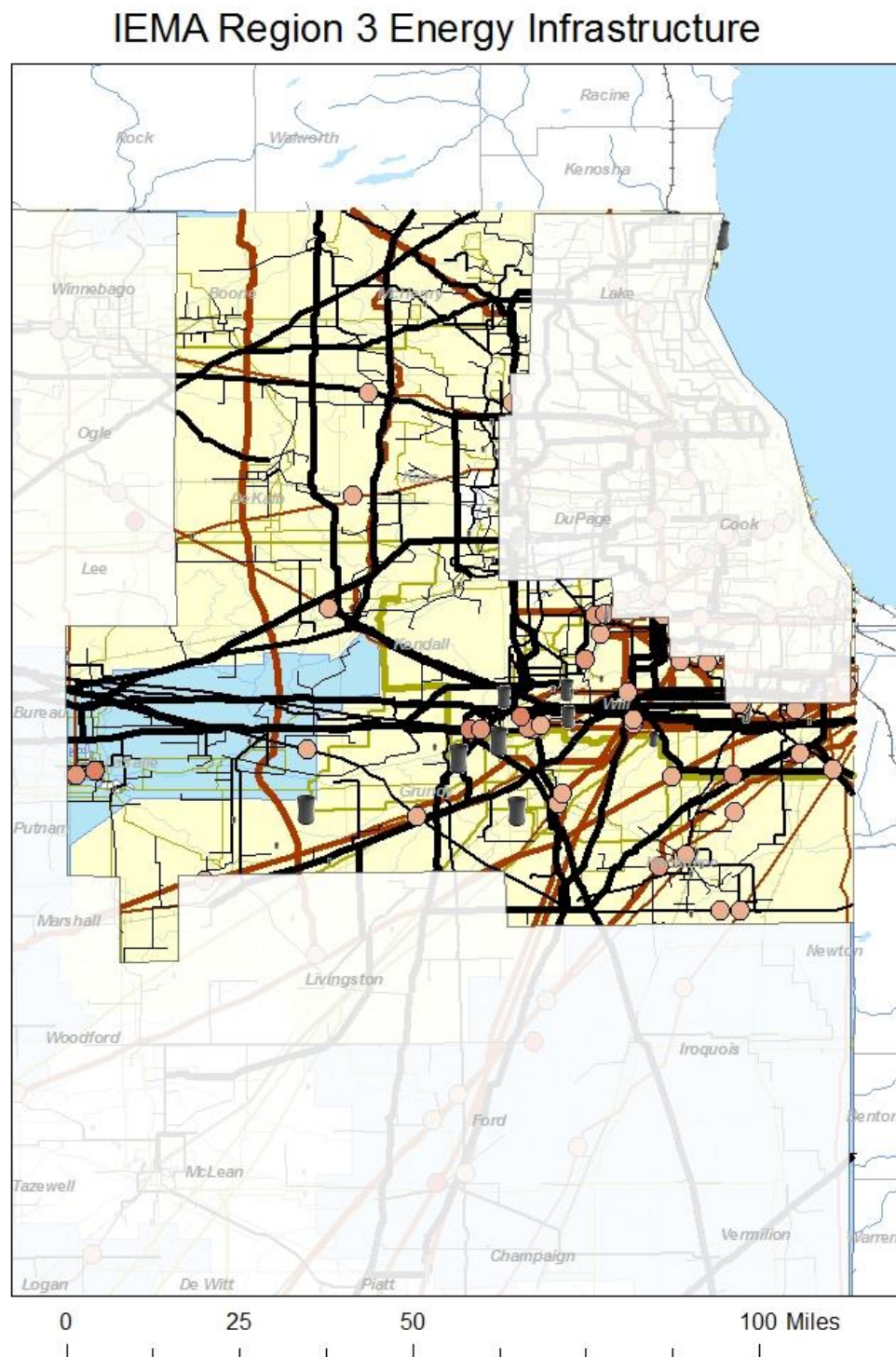
**IEMA Region Two** encompasses counties in northwestern Illinois. Major cities include Moline and Rock Island (Quad Cities area). The primary infrastructure concerns for this region include 9 wind farms, 2 nuclear electrical generating facilities along the Mississippi River, intersecting high voltage electrical wires, and petroleum and natural gas pipelines which feed large metropolitan areas like Chicago. A number of large natural gas pipelines intersect in this region, in particular midway between Sterling and Geneseo in the center of the region. Earthquake risk for this region is low but damage to these pipelines could reduce natural gas supply for not only the Midwest but East Coast also. There are no refineries in the region. The region is unique in that it includes four electrical utility territories, including the smaller territories for Interstate Power and Light and MidAmerican Energy as well as Ameren and ComEd. Major concerns for the region include severe storms and flooding. Wind farms can withstand very high winds, and the area is not at high risk for earthquakes, but the high number of wind farms means they should be considered when disasters occur. Wind farms may also interfere with radiation fallout should a nuclear accident occur. The location of wind farms in relation to the plume direction should be considered.

Figure 13. IEMA Region 2



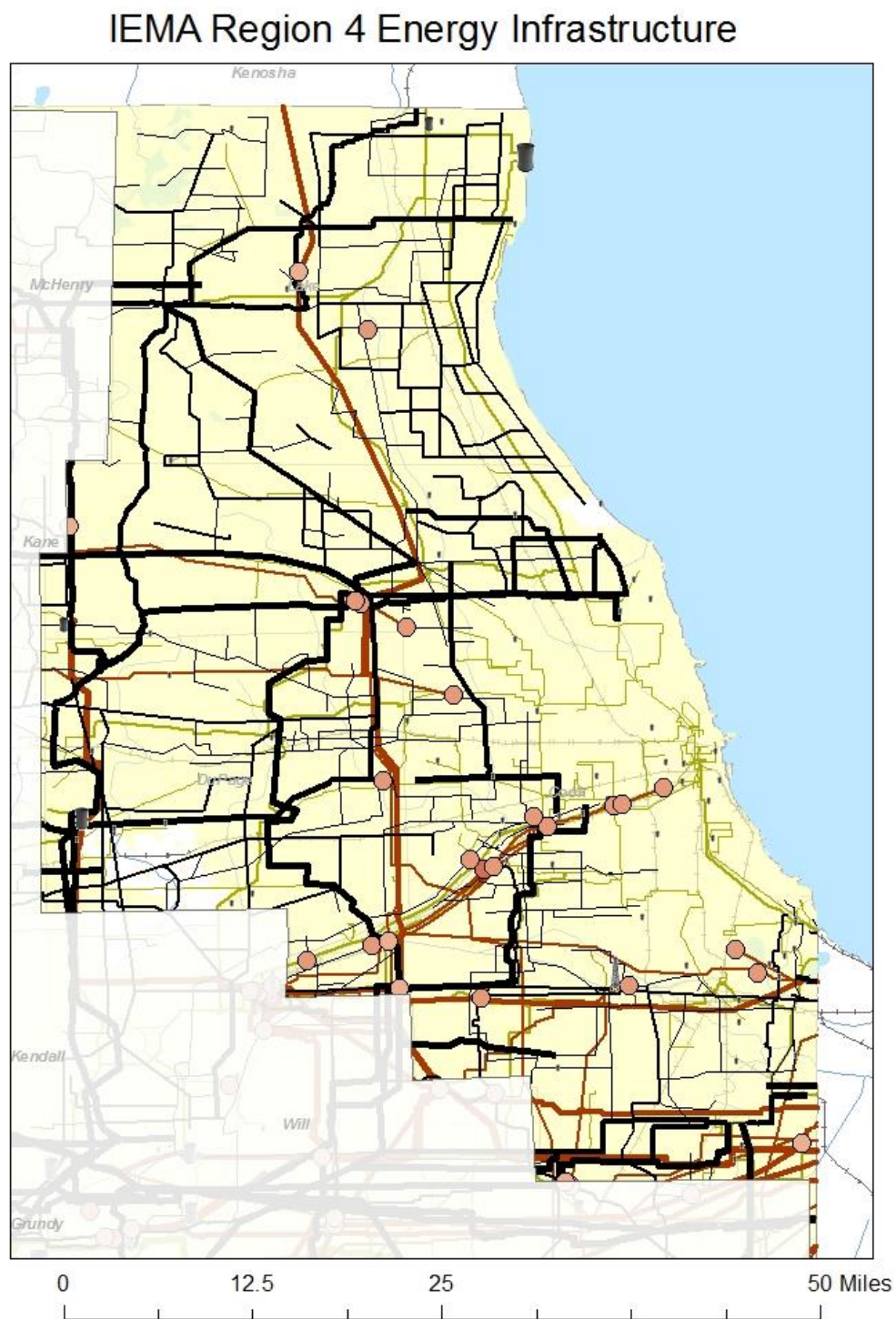
**IEMA Region 3** includes the counties that surround the Chicago area (collar counties). Cities in this region include Joliet, Kankakee, and Dekalb. The ExxonMobil Refinery in Joliet operates in this region. Two natural gas pipeline hubs are also in the region near the refinery. Two nuclear electrical generation plants are also in this region, and a number of high powered transmission lines run through the region. Because the region surrounds Chicago, contains a refinery and two natural gas hubs, it has a great number of natural gas and petroleum transport pipelines. Any land-based fuels brought into Chicago (unless from Wisconsin) go through this region. Its natural gas service is from Nicor, and its electrical service is with ComEd. The region is densely populated. It is not at risk for earthquakes, but severe storms in summer and winter and possible terrorist activities are threats.

Figure 14. IEMA Region 3



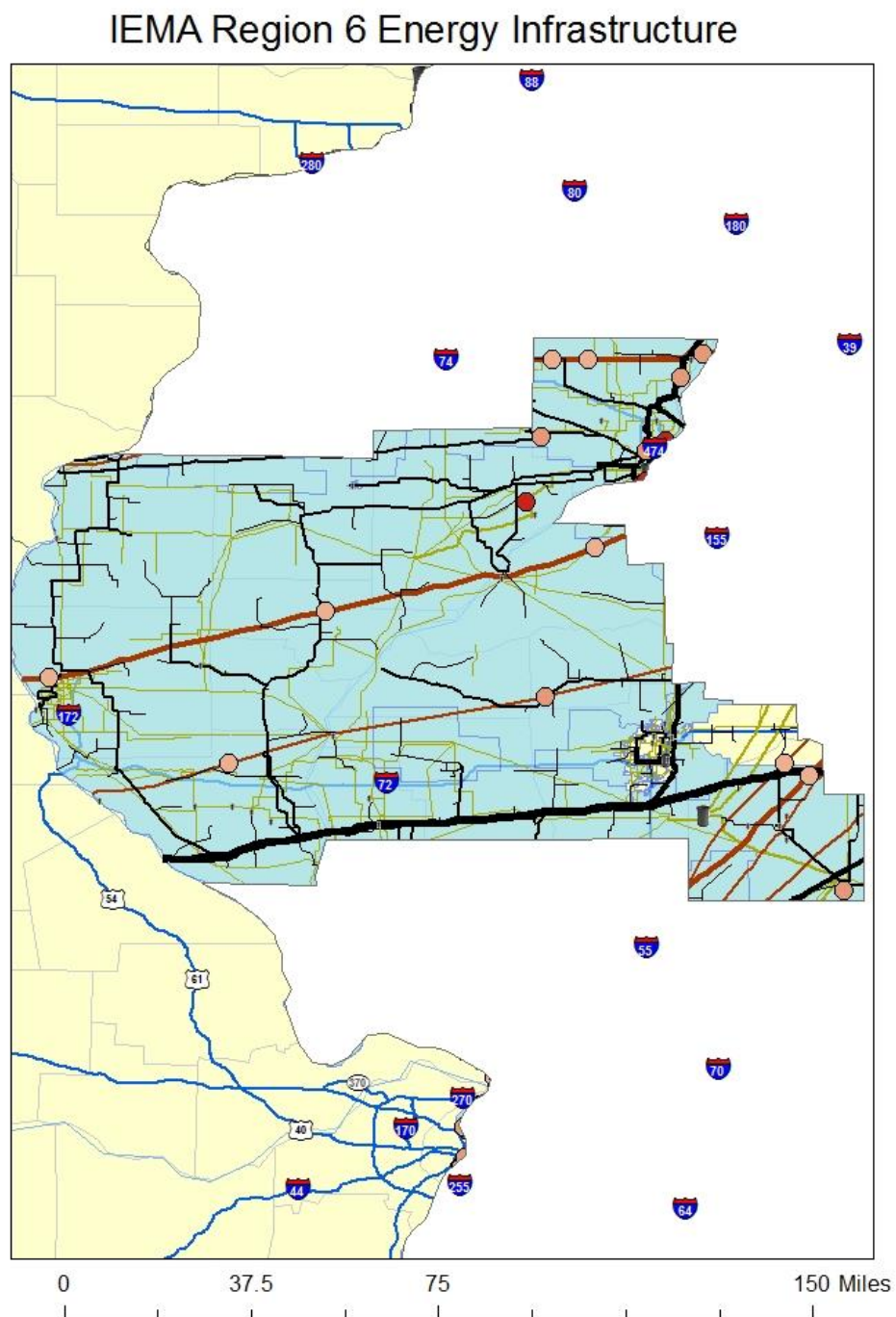
**IEMA Region 4** includes Chicago's Cook County, along with Lake County to the north and DuPage County to the west. It's serviced by Nicor and People's Gas for natural gas and ComEd for electricity. While the region does not have any nuclear facilities or refineries, the large number of residents and high requirements for energy make infrastructure leading into this region critical to protect. A number of natural gas and petroleum pipelines run through the region along with a number of petroleum and natural gas facilities. The region is at risk for winter and summer storms and terrorism.

Figure 15. IEMA Region 4



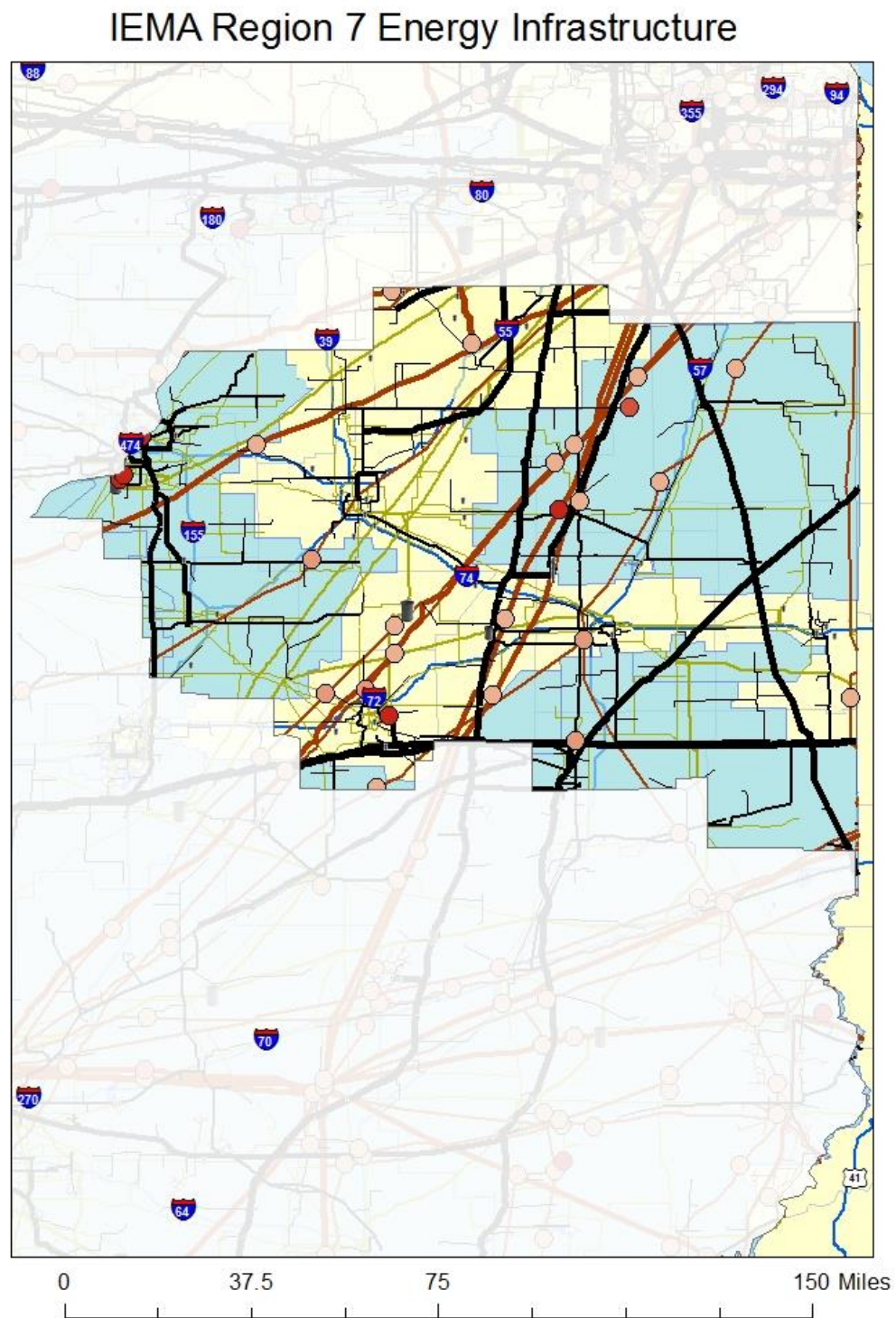
**IEMA Region 6** is in the west central part of the state. Major cities include Peoria, Quincy, and Springfield. The region is at risk for flooding, as the Illinois and Mississippi rivers confluence here. Ameren provides electricity and natural gas for the majority of this region although Nicor serves some counties along the Mississippi River, and Springfield's utilities are municipally run. The region has no refineries or nuclear facilities, but like other regions in the state, it has a number of high voltage power lines which run through the region some of which intersect here.

Figure 16. IEMA Region 6



**IEMA Region 7** covers the east central part of the state. Major cities include Bloomington, Champaign, and Decatur. There are no refineries in this region, and 1 nuclear facility at Clinton. The region has several wind farms, and a number of high voltage electrical lines transect the region as well. It is primarily serviced by Ameren for electricity and natural gas. The region is not particularly at risk for flooding or earthquakes; the main risk is severe storms. The region is home to the state's only liquefied natural gas production facility in Gibson City.

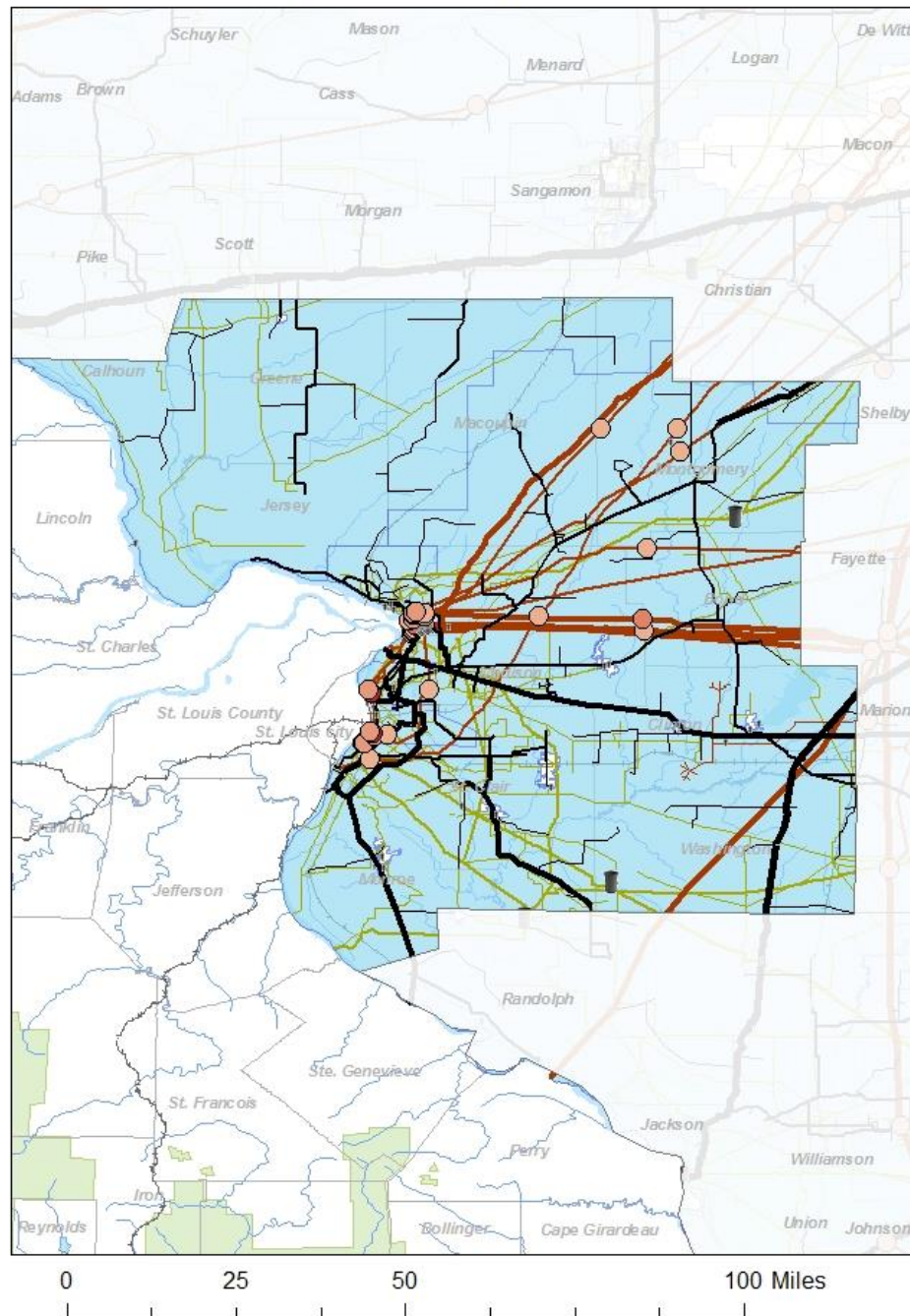
Figure 17. IEMA Region 7



**IEMA Region 8** includes the southwestern part of Illinois surrounding St Louis. A 306,000 bbl/day ConocoPhillips refinery is in the region near Wood River. Several petroleum pipelines converge at this location. There are no nuclear electrical generating facilities or wind farms. The region is vulnerable to flooding and would take impact from a New Madrid earthquake.

Figure 18. IEMA Region 8

### IEMA Region 8 Energy Infrastructure

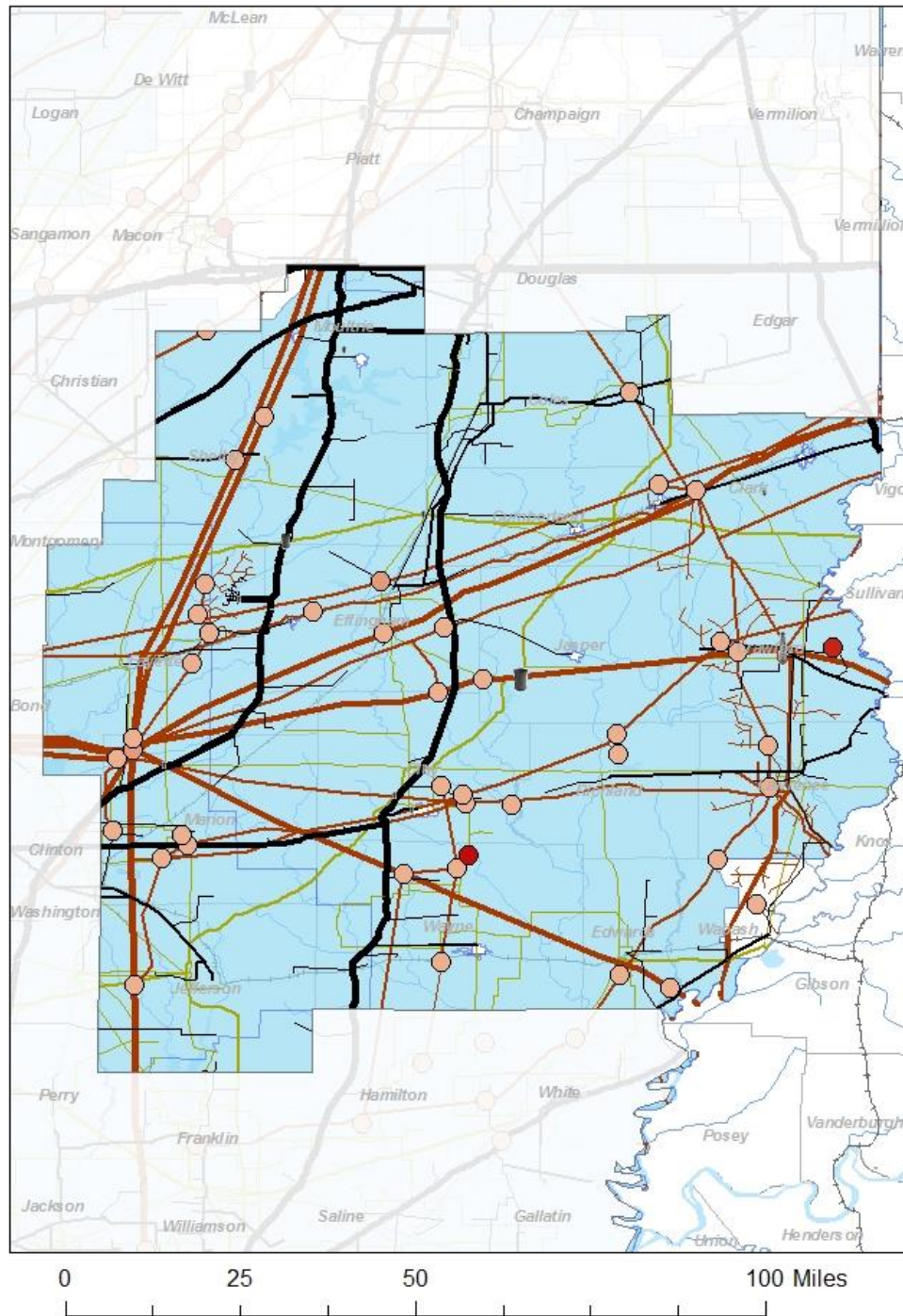


**IEMA Region 9** covers the southeastern part of the state. Major cities include Marion,

Charleston, and Effingham. One refinery, owned by Marathon Petroleum Company (215,000 bbl/day) is located in the region near Robinson. A number of petroleum pipelines intersect in this region. The region is home to a major crude oil storage tank farm located near Patoka where several companies hold crude oil. Impacts to this tank farm could significantly impact fuel supply and pricing. There are no nuclear electrical generating facilities or wind farms, but a number of high powered transmission lines run through the northwestern half of the region.

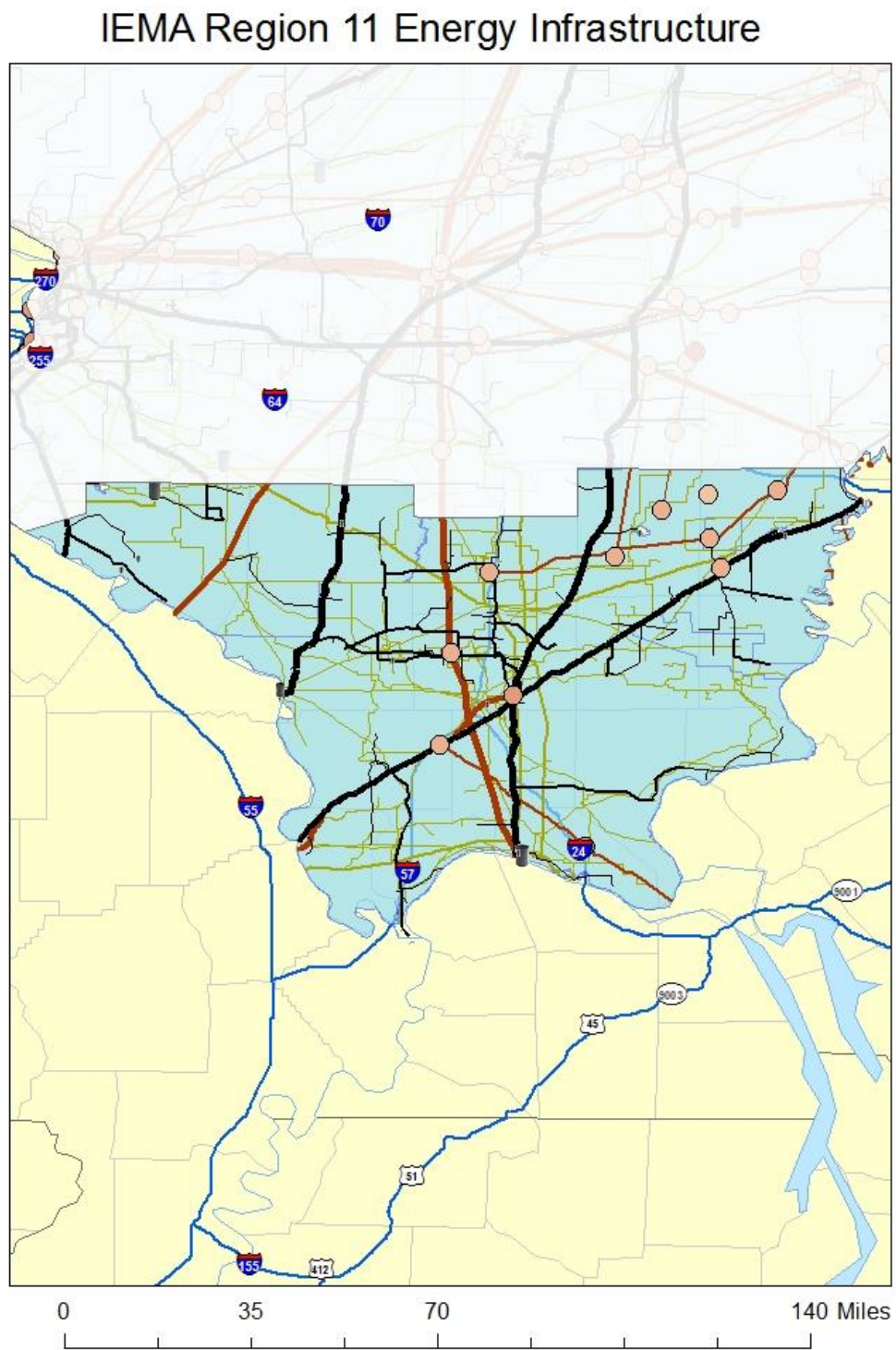
Figure 19. IEMA Region 9

### IEMA Region 9 Energy Infrastructure



**IEMA Region 11** includes the fifteen counties on the southern end of Illinois. The region does not have refineries, nuclear electrical generating facilities, or wind farms. It is not heavily populated but is the IEMA region most at risk of earthquake. It has had a number of strong storms including tornadoes, ice storms, and strong thunderstorms that many have referred to as inland hurricanes because of the strong winds. A number of large natural gas and petroleum pipelines intersect just south and west of Williamson. If an earthquake were to occur and damage occurred to these pipelines, supply would be reduced significantly.

Figure 20. IEMA Region 11



## **Section Five. State of Illinois Energy Assurance Geographic Information System**

As a component of energy assurance preparedness, the State of Illinois has developed a state-wide energy sector geographic information system (GIS) for use by state energy assurance personnel in preparation for and response to energy emergencies. The GIS includes energy infrastructure layers such as electrical lines, natural gas and petroleum product pipelines and energy sector facilities which were purchased from a commercial vendor (MapSearch) after vetting several commercial sources for this information. The database also offers customized data layers generated by the state including integrated outage maps from ComEd and Ameren, locations of state facilities, gas stations, locations with combined heat and power capabilities and bio-fuel facilities. The database is available online and using mobile smartphones and iPhones. The database is password protected. For access requests, please contact the state Energy Assurance Engineer, Rajiv Narielwala at [Rajiv.Narielwala@illinois.gov](mailto:Rajiv.Narielwala@illinois.gov) or at 217-785-2638.

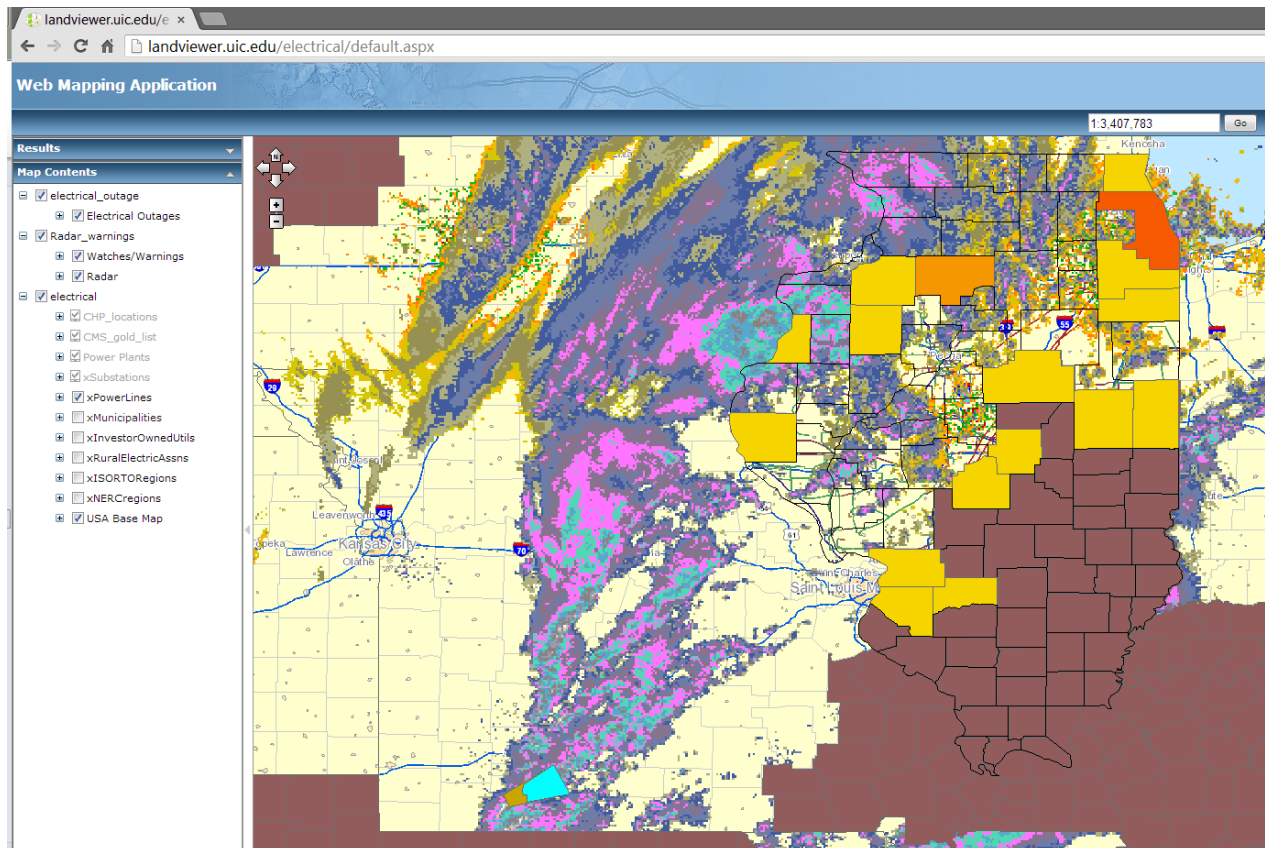
The GIS is categorized into the different state energy sectors (electrical, natural gas and transportation fuels) with different web-based GIS portals dedicated to each. Below is a discussion of the layers available in each and their potential uses for state energy assurance. Information on renewable energy sources such as ethanol or wind turbines are included in their respective energy sectors (i.e. transportation fuels for ethanol and electric for wind turbines).

### **Electrical**

The state of Illinois energy assurance GIS portal for the electrical sector includes three primary types of layers; 1) electrical infrastructure, 2) restoration priorities and 3) tools for monitoring potential and ongoing energy emergencies. The primary electrical infrastructure data layers include a) transmission power lines (which include information on owner/operator, voltage etc), b) power plants (generating capacity, owner/operator, primary fuel source etc), c) utility, municipal utility and rural cooperative territories and d) substations. The primary restoration priority layers include layers which show the location, tenants and purpose of all state owned or leased buildings, hospital, schools, and police and fire departments. The primary monitoring tools include a) a map which shows the number of outages by county as reported by ComEd and Ameren (the state developed tools which extract this data from each utility's web page and posts them combined in the state's GIS, b) a weather radar for tracking storm movements and intensity (courtesy of the National Weather Service) and c) issued weather watches and warnings. Using the three groups of layers in unison, the state can monitor for weather related disasters, determine where current electrical outages are occurring and be aware of what important infrastructure layers (transmission lines, power plants) and facilities may be in the line of a weather event. Figure twelve demonstrates the GIS portal with all layers displayed. Dark maroon counties are

under a high wind advisory, the blue to gray to pink layer is the radar and the counties in shades of yellow to red have customers without power.

Figure 21. State of Illinois Electrical Sector Energy Assurance GIS Database

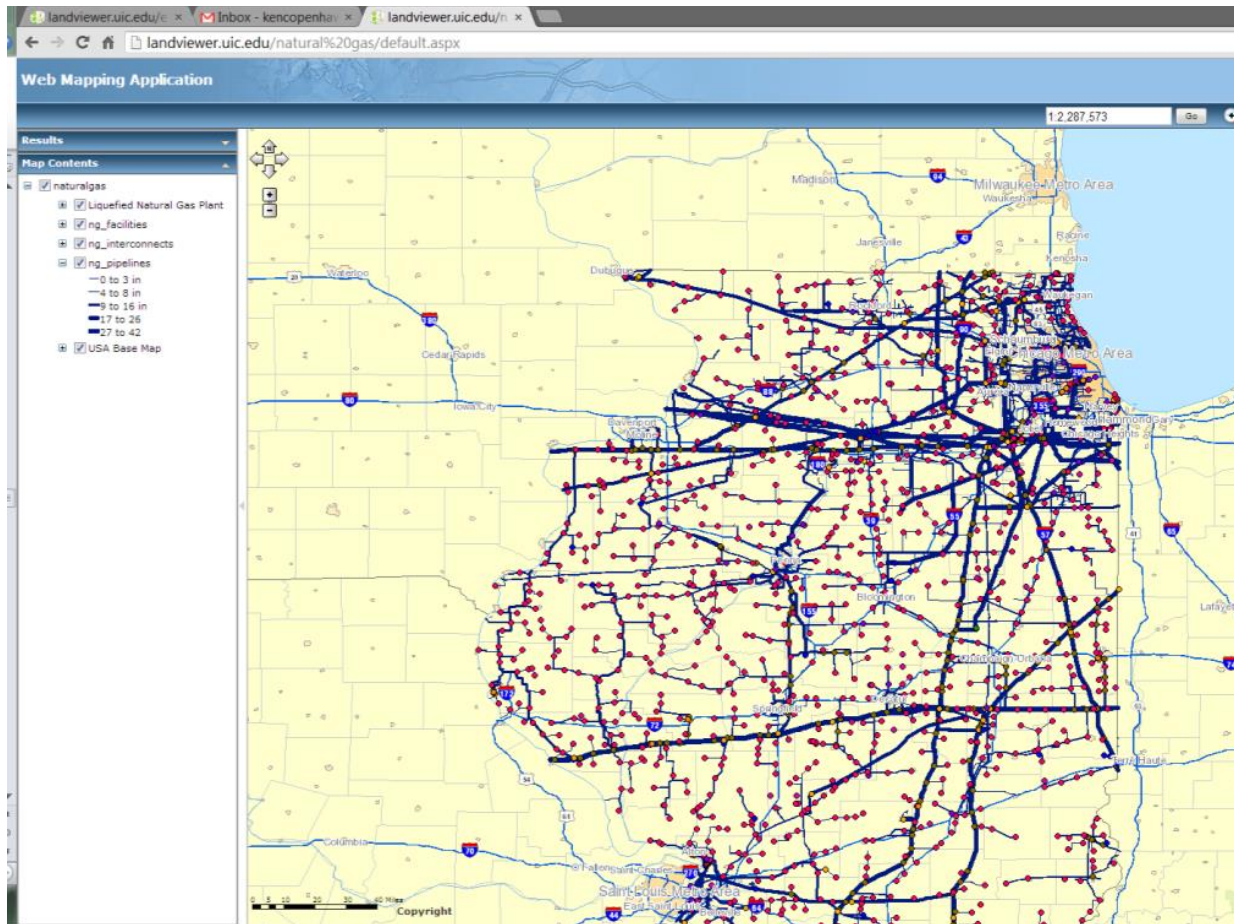


## Natural Gas

The natural gas infrastructure in Illinois is not as detailed as electric, and this is reflected in the complexity of the GIS. The natural gas GIS portal includes a layer for pipelines which includes information on ownership and diameter, facilities which include processing plants, compressor stations and delivery points, interconnects and the location of Illinois' only liquefied natural gas plant. Figure twenty one is a demonstration of the natural gas GIS portal. The dark blue lines on the map are natural gas pipelines which have various line widths based on diameter of the pipeline. The energy assurance team could use the map to determine potential damage to above-ground natural gas infrastructure (facilities, interconnects) in the case of a weather event or potential below ground damage to pipelines in the case of uprooted trees from a storm or an earthquake. Only natural gas pipelines that transmit gas between facilities were included in the

GIS. The state feels that distribution lines which deliver gas to residents and businesses will be handled by utilities and municipalities, and the need for the state to become involved (driver hour waivers, equipment etc) would only occur if there was damage to the transmission pipelines.

Figure 22. State of Illinois Electrical Sector Energy Assurance GIS Database for the Natural Gas Infrastructure



### Transportation fuels (petroleum)

The transportation fuel network in Illinois is dominated by the movement, refining, distribution and sales of petroleum products. The State of Illinois energy assurance GIS database includes layers for the movement (pipeline, interconnections and pumping stations), refining (refineries), distribution (pipelines and terminals) and sales (gas stations including specific information on stations which offer alternative fuels (E85, LNG, Bio-deisel). The state is working with the Illinois Petroleum Marketing Board on a survey to determine which stations have backup power. The information contained in the transportation fuels database can be used by the state to study the flow and potential disruptions to petroleum through pipelines, determine the locations of terminals which may be able to offer fuel to emergency vehicles, the location of gas stations

Figure 23. State of Illinois Electrical Sector Energy Assurance GIS Database for Transportation Fuels



## **Acronyms**

CMS- Illinois Central Management Services

ComEd- Commonwealth Edison

DCEO- Department of Commerce and Economic Opportunity

EAE- State of Illinois Energy Assurance Engineer

EEAC- Emergency Energy Assurance Coordinator

EOP- Emergency Operation Plan

ERC- Emergency Response Center

FEMA- Federal Emergency Management Agency

ICC- Illinois Commerce Commission

IDOC- Illinois Department of Corrections

IDOT- Illinois Department of Transportation

IERG- Illinois Energy Reference Guide

IECA- Illinois Electrical Cooperatives Association

IEMA- Illinois Emergency Management Agency

IEOP- Illinois Emergency Operations Manual

IHCHMP- Illinois Human-Caused Hazard Mitigation Plan

IMUA- Illinois Municipal Utilities Association

INHMP- Illinois Natural Hazard Mitigation Plan

ISA- Infrastructure Security Awareness

ITHMP- Illinois Technological Hazards Mitigation Plan

ITTF- Illinois Terrorism Task Force

MAR2N- Mutual Aid Response and Resource Network

NERC- North American Electric Reliability Corporation

PHMSA- Pipeline Hazardous Materials Safety Administration

RFC- Reliability First Corporation

SEO- State Energy Office

SEOC- State Emergency Operations Center

SERC South East Reliability Corporation

SIRC- State Incident Response Center

UAC- Unified Area Command

## **Appendices**

### **Appendix 1. State of Illinois Energy Supply Disruption Tracking Process**

#### **State of Illinois Energy Supply Disruption Tracking Process**



**Illinois Department of Commerce and Economic Opportunity**

**State Energy Office**

**August 2010**

**Updated August 2012**

# **State of Illinois Energy Supply Disruption and Response Tracking Process Plan**

## **I. Introduction and Overview:**

As a component of the *State of Illinois Energy Reference Guide*, the following document outlines a process for tracking the duration, response, restoration, and recovery time of energy supply disruption events (Supply Disruption Tracking Process (SDTP)). The document will serve as an introduction to the more encompassing *State of Illinois Energy Reference Guide* by indicating the data used and people responsible for the decisions required for successful energy assurance at the Illinois state level. Effective tracking of the state's energy supply and potential disruptions will require participation by a number of state and local agencies as well as the private sector, and a thorough understanding of the state's energy requirements, uses, supplies, demand and potential disruptions, along with the severity and recovery time from those disruptions. Illinois has its own unique energy profile with a mix of nuclear and coal powered electricity and a growing ethanol industry which require a unique plan for tracking potential disruptions and remediation efforts for energy restoration.

This document will outline a proposed supply and disruption tracking process understanding that the process will evolve and change over time as the Energy Reference Guide is defined and implemented, and state agencies and private entities identify their roles. It should be understood that all sources of information, responsible parties and other Energy Reference Guide components will not be documented here, only the proposed methods to develop this information. The actual information and plan to execute will be covered in the state's Energy Reference Guide which will grow, in part, from this document. However, this document will attempt to define the method proposed to track disruptions and will also identify potential gaps that currently exist either in data, personnel, the knowledge base or within the state agencies to meet all the requirements to thoroughly map and track energy disruptions to the state of Illinois, and will define the required communication to ensure disruptions are discovered, restored and communicated to policy makers and the public in the most efficient, accurate and timely manner.

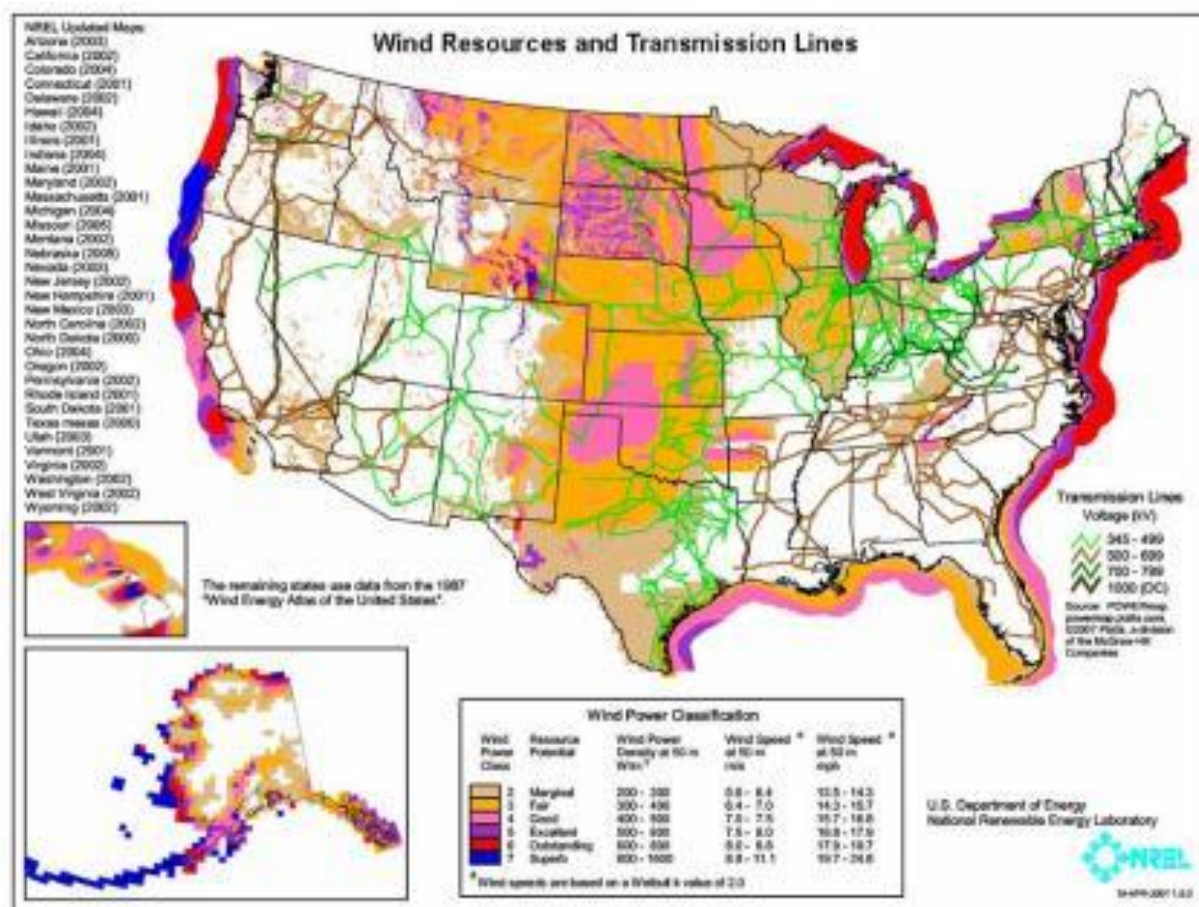
We propose four steps to developing the disruption tracking and restoration process. These include: 1) Defining the state's current energy sources, supply and demand 2) Defining and understanding the state's infrastructure for delivery to users 3) Understanding and cataloging potential disruptions to the state's energy supply along with the risk of these disruptions occurring and the potential damage to supply from each 4) Developing a management plan for the discovery, reporting, communication and restoration of energy disruptions within the state.

## **II. Energy Portfolio of Illinois**

The first step in the process for tracking energy supply disruptions is defining the energy profile of the state of Illinois. In other words, what forms of energy are currently used and also an examination of what energy sources may be used in the future by the state, the projected demand for this energy, defining the supply of these sources, current and future, and the infrastructure for transporting that energy.

This assessment will be performed using available literature and statistics such as those available from the Illinois Commerce Commission, the U.S Department of Energy's (DOE) [Energy Information Administration](#)'s (EIA) Statistics and the US Environmental Protection Agency's Emissions and Generation Resource Integrated Database (eGRID) for example. It's understood that the primary sources of energy for Illinois, like most states, include petroleum for transportation, natural gas for heating and coal and nuclear power for electricity, but Illinois also has the capacity to generate wind energy (Figure 1) and is generating large amounts of ethanol from in-state produced corn. A complete energy profile will examine all current and potential energy uses including future renewable energy production. In addition to the energy profile, the report should indicate the available supply of the materials required to produce this energy (petroleum, natural gas or coal for example), typically reported in days of supply, which will be critical to understanding the effect a disruption would have on the energy available to affected areas and will identify the infrastructure (pipelines, refineries, transmission lines etc.) required to transport the energy to needed locations.

Figure 1. Wind Energy Potential (for electricity generation) for States in the US indicates Illinois has Fair Locations Along Major Transmission Lines

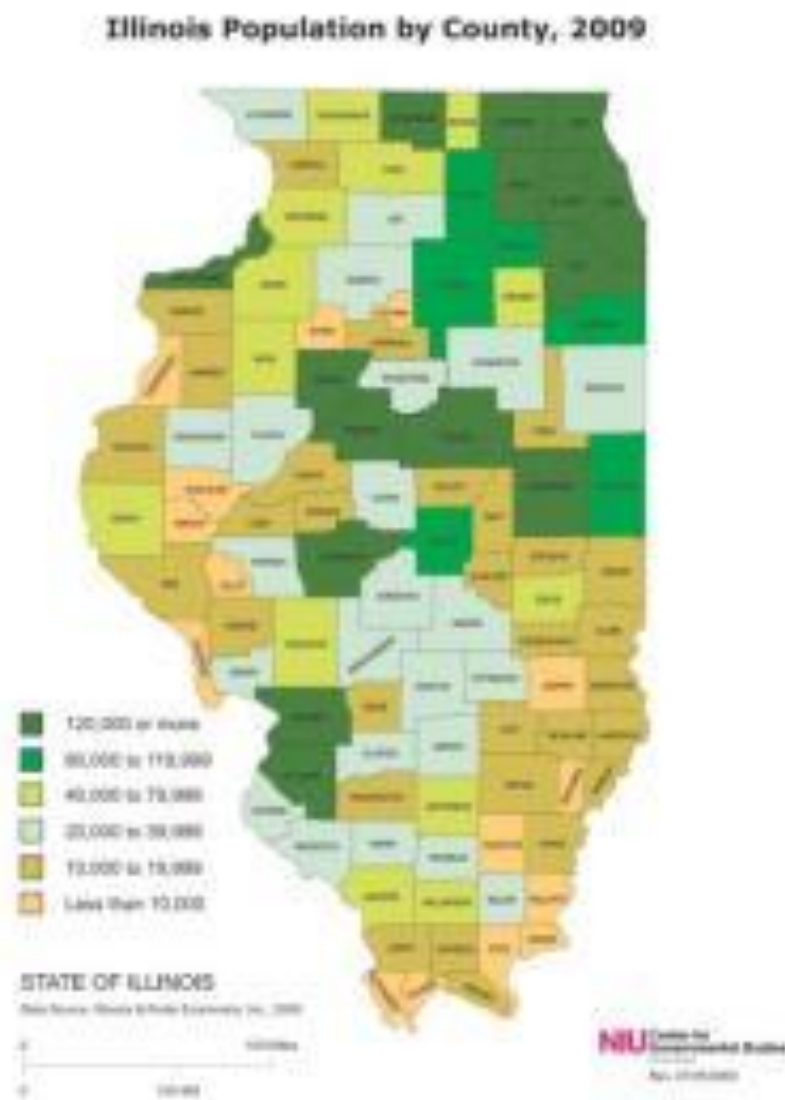


The second step in the development of a tracking plan for supply disruptions is to catalog the infrastructure associated with these energy sources. Where is energy produced in the state, where does energy and/or raw materials required to produce the energy enter the state, where in the state is it transported and how and where is it finally used? Much of this information can be found using the Department of Homeland Security's [Integrated Common Analytical Viewer](#) (iCAV) and [DHS Earth](#). These systems display much of the state's energy infrastructure in a geo-spatial format similar to a map and can also model potential disruptions. Other sources of information for the state's energy infrastructure may include geographic information system (GIS) layers from other sources, maps available from private sector participants such as electrical companies, natural gas companies and petroleum companies and information from federal and state agencies.

Along with an understanding of the infrastructure, the system should also account for the demographics of the state. Locations with a large population and/or large industrial base are obviously going to require more energy. Rural farming communities, predominant in Illinois,

have different energy profiles than large cities such as requirements for large amounts of natural gas during the fall for drying corn, but much lower energy demand during most of the year. Areas with growing populations could be taxing the energy infrastructure in their area. Much of this information is going to be intuitive based on the existing infrastructure, but including this information, which will be available from the US Census Bureau and other sources, most likely also in map format, when making decisions on disruption impacts, could assist the state in understanding the severity of the disruption on population and the economy (Figure 2).

Figure 2. Illinois Population Map shows population densities in the northeast (Chicago), central and southwest (St Louis suburbs) sections of the state.



## ***Overall Energy Portfolio***

Cataloging energy sources and supplies in the state of Illinois is going to begin with identifying the private companies that provide these services to the state. The [Illinois Commerce Commission](#) has this information available for the electricity, natural gas and petroleum industries. Once all of the energy providers for the state of Illinois have been identified, each will be contacted and asked to contribute information they have on their historical, current and projected supplies for their given energy source. The Illinois Commerce Commission will be contacted for information on these sources. Good communication with the private industry providers of energy to the state is critical to the success of tracking energy and disruptions.

To understand and quantify energy supply, there are some general publications available that identify supplies for multiple energy sources including the [Energy Assurance Daily](#) which is a publication of the EIA that discusses major developments in the electricity, petroleum and natural gas industries which could reduce supply. The EIA also puts out information on total energy use including annual energy consumption by source for each [state](#). Table one indicates the energy sources and total british thermal units (Btu) for Illinois in 2008. Twenty four percent of the total energy used in Illinois was from nuclear generated electricity versus the national average of 8.5%. This could be a critical difference in Illinois' energy portfolio which needs to be taken into account when considering energy assurance and potential disruptions. Below is summary of information for these major energy sources for Illinois.

Table 10.2010 Illinois Energy Use In Trillions Of Btu (source: US DOE/EIA)

<b>State</b>	<b>Total Energy</b>	<b>Coal</b>	<b>Natural Gas</b>	<b>Petroleum</b>	<b>Nuclear</b>	<b>Renewable</b>	<b>Interstate Elec. Flow</b>
Trill Btu	4,430	1,069	935	1,230	1,005	191	-493.7
%	100%	24%	21%	23%	28%	4%	-12%

As mentioned, much of the information regarding infrastructure is available using iCAV which was developed by the Department of Homeland Security. ICAV has over 400 infrastructure data layers that can be viewed in a geospatial (map) format online. ICAV also provides information on population densities and weather which can be viewed to estimate potential impact of weather events on given infrastructure and population densities, and can have customized input that can be distributed to users. The Illinois Commerce Commission also publishes an [annual report](#) on the availability of electrical and natural gas by geographic area in Illinois. An overview of Illinois' energy strengths and weaknesses would indicate the state is a major transportation, distribution and oil refining location and produces a good deal of electricity but also imports much of the sources for energy production (Table 2).

Table 2. Strengths and Weaknesses of Illinois Energy Supplies

Strengths	Weaknesses
<b>Petroleum</b>	
<ul style="list-style-type: none"> <li>* Leads the Midwest in refining capacity</li> <li>numerous pipelines run through and terminate in state</li> <li>* 4 in-state refineries</li> <li>* Oil coming from Canada and Gulf Coast to IL refineries</li> </ul>	<ul style="list-style-type: none"> <li>* Most of state's petroleum is imported making state vulnerable to supply disruptions</li> <li>* Any disruption in down-stream pipelines impacts Illinois production</li> </ul>
<b>Electricity</b>	
<ul style="list-style-type: none"> <li>* Top nuclear electricity producing state in US</li> <li>* 3rd largest coal reserves in US</li> <li>* Leading producer and net exporter of electricity</li> </ul>	<ul style="list-style-type: none"> <li>* Top energy consuming state due to industry</li> <li>* Most of state's coal inaccessible and high in sulfur</li> <li>* Strong reliance on coal and nuclear (Over 95%)</li> </ul>
<b>Natural Gas</b>	
<ul style="list-style-type: none"> <li>* Major transportation hub for natural gas</li> <li>* Numerous pipelines run and end in state</li> </ul>	<ul style="list-style-type: none"> <li>* Most natural gas used by state is imported</li> <li>* Any disruption in down-stream pipelines impacts Illinois production</li> </ul>
<b>Renewable</b>	
<ul style="list-style-type: none"> <li>* Top producer of corn-based ethanol</li> <li>* Potential for wind and solar contributions</li> </ul>	<ul style="list-style-type: none"> <li>* Little potential for hydro-electric development</li> <li>* Estimated renewable capacity will not meet state demand</li> </ul>

## ***Petroleum***

Being so closely associated with the price of gasoline, petroleum prices and supply are closely monitored and discussed on a daily basis by major media outlets. Price per barrel is often listed on news programs, and changes in the price of gasoline are commonly listed on [websites](#) such as [gasbuddy.com](#). Sudden increases in the price of gasoline may be a sign that oil supplies have gone down or the potential for disruption exists as this market reacts quickly. Illinois has four petroleum refineries, two of which are in the Chicago area and leads the Midwest in refining petroleum into products (gasoline, diesel, propane, heating oil). The state had an oil reserve of 54 million barrels in 2008. This amount varies by year and should be monitored.

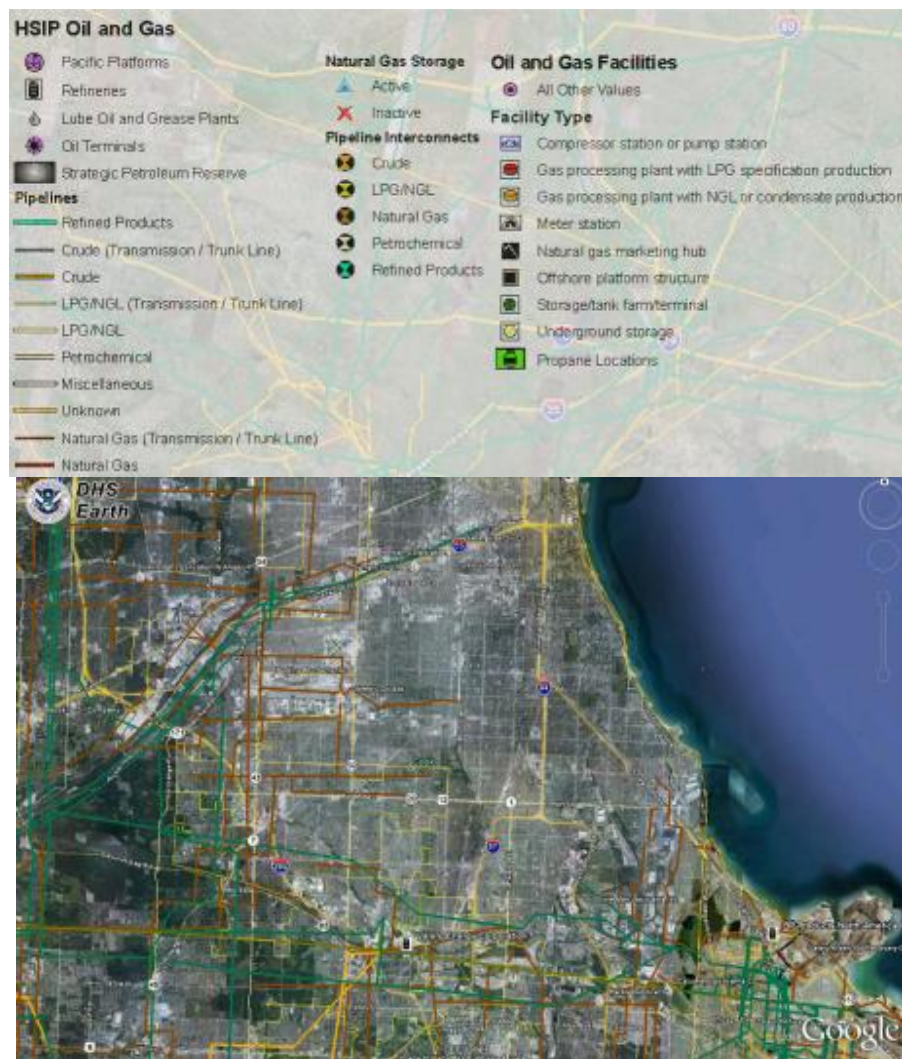
The EIA [has data](#) on many different components of petroleum supply, sales and sources including a petroleum status report, pricing reports for gasoline, diesel, heating oil and propane and an import report. The EIA publishes a report on first sales of petroleum products directly into [states](#) which could be useful in calibrating new supplies of petroleum coming directly to the state. The EIA also publishes a report on petroleum wholesale and retail prices at the [state level](#). Petroleum inventory and production is also monitored and reported by EIA at the [state](#) and [regional](#) level. All of these reports may be used to monitor current supply and use, and predict changes in supply and pricing which could be indicative of supply or future shortages. The American Petroleum Institute also provides a [number of sources](#) of information regarding petroleum supplies, gasoline prices and imports.

Of course, as in the case with other energy supplies, contact with industry is essential. Existing industry contacts will be gathered from current state employees such as those with the Illinois Commerce Commission and will be logged within the Illinois tracking database. These companies will be contacted as part of the Energy Reference Guide and asked for methods they use and may be willing to share to monitor use, supply, demand and trends.

Understanding the effects of weather on heating oil and propane sales and prices, and understanding peak gasoline use periods can also help when monitoring demand for petroleum products. Long cold spells may lower heating oil supplies and peak summer vacation and holiday travel periods may lower gasoline supplies. Also, during certain times of year, gas blends are changed. This can also impact supply and pricing and needs to be understood. When combined with a disruption, the effect from these situations on energy assurance will be more extreme.

The EIA [publishes a list of operable refineries](#) which can be used to determine where oil is being converted to gasoline, diesel, propane and heating oil. Oil pipeline information is available from iCAV and DHS Earth (Figure 3). Illinois is a major transportation hub for crude oil. Several crude oil pipelines terminate in Illinois making this a point of concern for disruptions to petroleum supplies not only in Illinois but surrounding states.

Figure 3. DHS Earth Screen Capture of Oil and Gas Infrastructure in and around Chicago, IL



### *Natural Gas*

The natural gas market should be more difficult to monitor than petroleum. However, there are some tools available that can be helpful. The EIA publishes a [monthly report on natural gas inventories and deliveries](#) to industrial, commercial and residential customers, withdrawals from

underground storage and pricing. This information is compared to previous years and 4-month averages and can be used to identify trends in price and use. Also, according to the National Association of State Energy Officials (NASEO) Energy Assurance Guidelines, two other indicators of changes in natural gas supply are spot and contract prices and curtailment notices. Efforts will be made to obtain information on each of these as well from the state's natural gas providers. Eighty percent of the state's households rely on natural gas for home heating. This is the primary use of natural gas in Illinois. Weather will also need to be watched. Long-term cold spells may reduce supplies. To meet peak demand in the winter, the state stores natural gas in natural aquifers and depleted oil and natural gas reservoirs, but a disruption in a pipeline or accidental release of this gas could cause a shortage.

The ICC publishes an [annual report](#) that lists the natural gas providers in the state of Illinois (11 as of 2009), breaks it out by region and lists costs to consumers. Contacts will also be made with the natural gas industry personnel for each of these 11 companies to determine if they are acquiring and can share information on supplies and in-state demand.

The previously mentioned Illinois Commerce Commission report offers information on companies that distribute and sell natural gas by region in the state of Illinois. Natural gas pipelines, similar to petroleum pipelines are also available from iCAV. Similar to petroleum, Illinois is a major transportation hub for natural gas. Several natural gas pipeline systems converge at Chicago including systems from the Gulf Coast, western Canada and just starting in 2009, a pipeline from Colorado and Wyoming.

### ***Electricity***

Ameren and Commonwealth Edison are the primary providers of electrical energy in the state of Illinois with MidAmerican and Mount Carmel providing small supplies. Each company will be contacted and information requested regarding their energy sources and supply of these sources. However, many federal government sources of information are also available for electricity. All electrical sales are reported to the EIA including sales of electricity generated from renewable energy at the state level for biomass, wind, geothermal and solar by state. The site also gives information on sources for electricity generation by state which will allow the tracking of the use of specific sources such as coal and natural gas, and the monitoring for reduced supplies of these raw materials for electrical generation, according to the site, coal and nuclear account for over 95% of the state's electricity generation. Also published by the EIA is a [quarterly coal price and inventory report](#) which will allow monitoring of coal supplies, availability and use including the number of in-state days of supply. Illinois has large coal reserves, but the coal is high in sulfur and must be mixed with low sulfur coal from the western US (primarily Wyoming) before combustion to meet regulations.

Other data provided by EIA for electricity supply includes an annual inventory of power plants in the United States which has been discontinued but contains historical data on electrical generation by state and by energy source for gas, coal, petroleum and hydroelectric.

The USEPA's Emissions and Generation Resource Integrated Database (eGRID) also produces a database which contains all electricity generating plants, their net generation of energy by source by year (coal, nuclear, biomass etc.), and the plant's location including latitude and longitude coordinates which will allow for input into a geographic information system for mapping purposes.

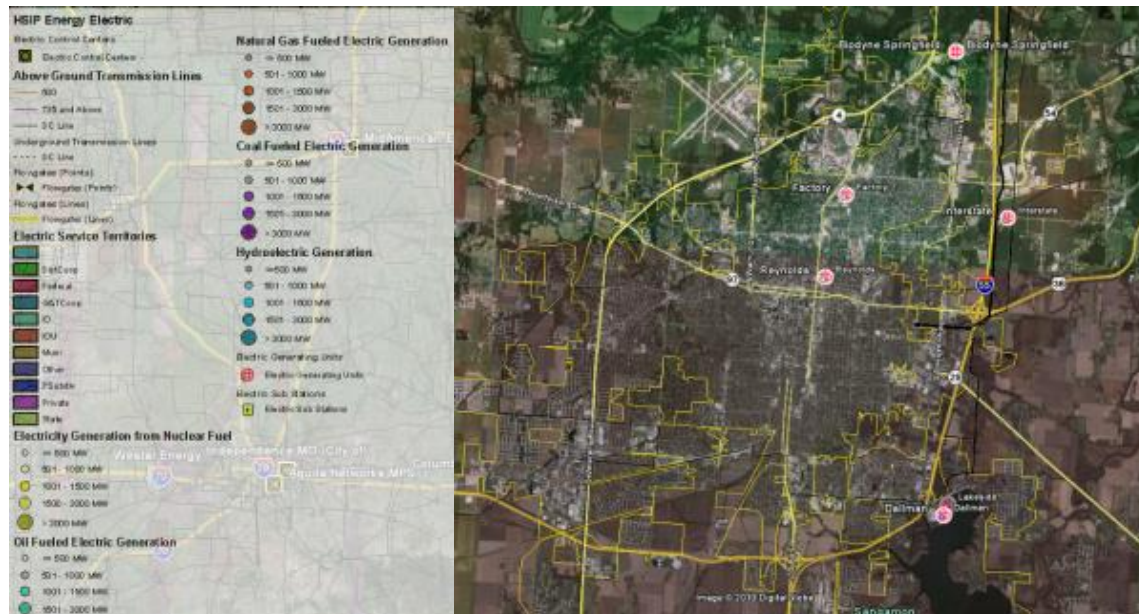
Other useful information for tracking potential demand for electricity includes weather information, which is available online from a number of sources. Temperature and long term forecasts of elevated summer or cold winter temperatures may indicate increases in demand.

Specific to Illinois, the Illinois Commerce Commission publishes reports on electrical sales by year broken out by company, price and user (retailer, commercial, public etc.) for the state. The data is broken out by region and could give insight into use and demand by region.

Because such a high percentage of Illinois' electrical energy is produced using nuclear power, this will require special attention. The source for nuclear power generation is not expected to be an issue nor price for this source, but other factors, such as reactor failure or terrorism need to be considered. Illinois has six nuclear facilities with eleven reactors.

The location of power plants and their energy sources in the state of Illinois is available from the USEPA's eGRID website including latitude and longitude information for entry into a geographic information system. Transmission lines, power stations and other electrical grid information are available for viewing on the iCAV and DHS Earth sites as well (Figure 4).

Figure 4. DHS Earth Screen Capture of Electrical Infrastructure for Springfield, Illinois

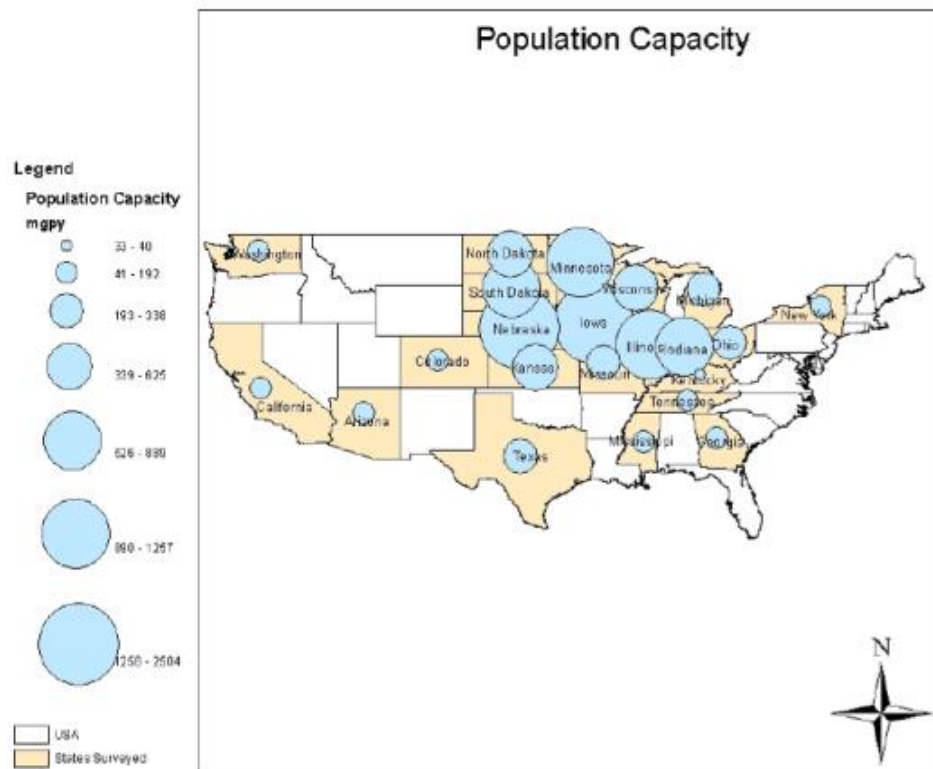


## Renewable Energy

The two primary components of Illinois' renewable energy portfolio are electricity from wind and solar and bio-fuels for transportation from ethanol (primarily from corn) and bio-diesel (primarily from soybeans). EIA reports minimal use of hydro-electricity in Illinois. Table one indicated that in 2010, just over 4% of the state's total energy was provided by renewable sources for electricity, and that 2,112 megawatts were generated from renewables in 2010. Illinois' renewable energy standard requires the state's utilities to be producing 25% of their electricity from renewable sources by 2025. Much of this is expected to come from wind.

Illinois being a large corn and soybean production state (often first or second in production nationally) makes it a good location for the production of corn ethanol and soy bio-diesel. Current ethanol production in Illinois is greater than 860 million gallons per year (Figure 5). Plants often keep ethanol in storage at the facility. Illinois River Energy, for example, reports keeping 300,000 gallons of ethanol in reserve at all times. The Governor of Illinois has the authority to suspend the blend wall in times of emergency (allowing for more ethanol to be used in replacement of gasoline for fuel). This could make ethanol a viable alternative to gasoline in times of emergency if supply is cut off.

Figure 5. Ethanol production by state in 2009.



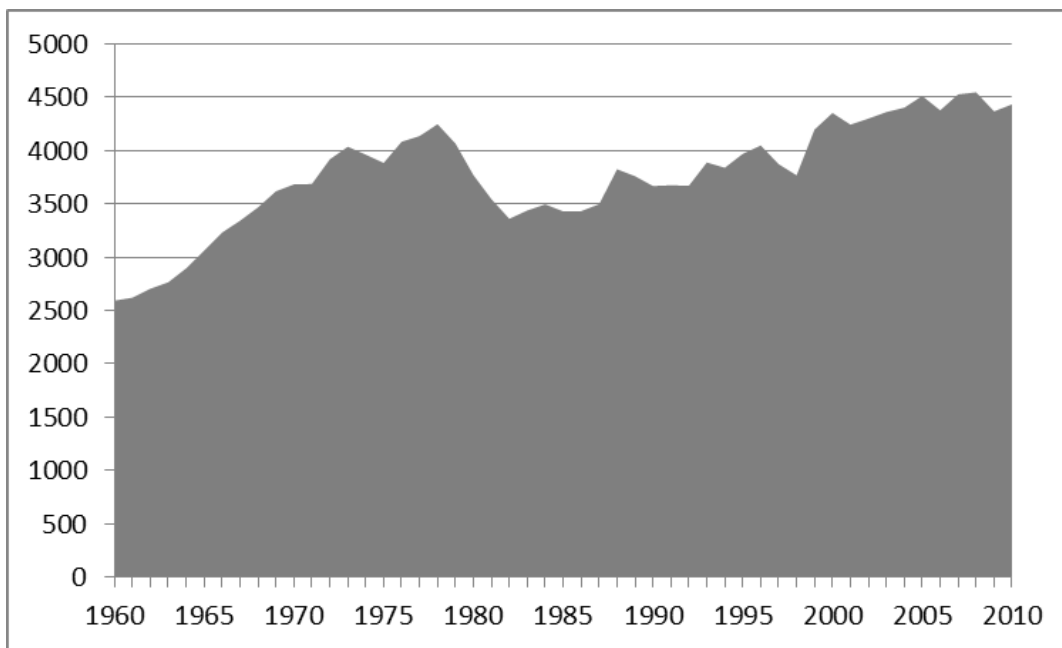
The site, [www.windpoweringamerica.gov](http://www.windpoweringamerica.gov) offers information on potential wind power generation [in Illinois](#). This site estimates close to 250,000 megawatts of electricity could be generated from wind energy in Illinois. The American Wind Energy Association shows current [wind projects by state, county and even by project](#) with megawatt potential for each project.

### Summary

A summary of Illinois' energy sources, infrastructure, supply and demand shows an increasing use of all energy sources since 1960 (Figure 6). With a diverse energy portfolio, including electricity generated from in-state sources of coal and nuclear energy, together with renewable energy from ethanol and bio-diesel and the potential for wind generation, Illinois has the potential to generate a good deal of, but not entirely all of the in-state energy supplies. Therefore, energy is going to be required from out of state and non-renewable sources which are anticipated to be in shorter supply. The state has an advantageous infrastructure, however, being one of the largest electricity generating states in the country with a typical surplus, and several natural gas and oil pipelines run through and terminate in Illinois, especially in Chicago with two oil refineries and a large natural gas hub. However, these same advantages increase the likelihood that a disruption of energy in Illinois could have effects not only in the state but

potentially several other states as well increasing the importance of energy supply and disruption tracking in Illinois.

Figure 6. Energy consumption (trillions of BTU) in Illinois since 1960 shows an increasing trend.



### III. Energy Supply Disruptions

Along with understanding the state's energy profile, and the infrastructure required to support this energy use, a complete catalog of potential disruptions to this energy supply needs to be thoroughly documented. Understanding the multiple types of disruptions is critical to understanding how to prepare for them. Also, understanding the severity of each of these impacts is critical. Smaller scale power outages from storms can be corrected by private utilities and small price changes can be adjusted for, but large scale disruptions are going to require state assistance in a number of ways.

Identification of historical interruptions in energy supply is a start for understanding future disruptions. This information should be available from a number of federal and state sources. Private companies who have in the past or currently provide energy to the state of Illinois will also be contacted and sources for this information requested. An additional question to answer will be if these disruptions could occur or are as likely to occur with the current infrastructure. A 1939 power outage may be less likely to occur with the current electrical infrastructure. In addition, however, the process should include the cataloging of potential future disasters which

may not have a historical basis such as terrorist attacks, cyber-threats and huge energy price hikes. Sources available from the Department of Homeland Security and other security agencies may be valuable for determining types and likelihood of future energy disruptions.

Once the severity and frequency of historical disruptions and the potential for future disruptions are cataloged, a database of disruptions (see addendum two) will be developed and additional information regarding state agency and private entities responsible for response and contacts within these organizations, severity and historical time to repair from similar disruptions (if available). The use of iCAV and other GIS tools may be able to predict the effect from different disruption scenarios. These tools will be developed also. One source for disasters that may effect energy infrastructure is the Department of Homeland Security's (DHS) Federal Disaster Declarations [page](#) which lists previous federally declared disasters by state and effected counties. This site also includes information on types of potential disasters. The DHS also publishes a [daily infrastructure report](#) which lists any new changes to national infrastructure.

### ***Petroleum***

The source and volumes of crude oil supply used by regional refineries may be found in the EIA [Petroleum Supply Monthly](#). This information is needed to estimate the extent to which refiners may need to shift supplies if any given source of crude oil is disrupted.

### ***Natural Gas***

[NGFast](#) is a tool develop by the DOE's Argonne National Laboratory to quickly model the impact of disruptions in natural gas pipelines. The US Government Accountability Office published a [report](#) which outlines potential natural gas disruptions and their effect. Disruptions can occur from damage to a pipeline but also from price changes and higher demand.

### ***Electricity***

[Ameren](#) and [Commonwealth Edison](#), the two major electrical utilities providers for Illinois offer outage information on their websites including a map that shows specific locations for outages. The Electric Emergency Incident and Disturbance Report provides information on electric emergency incidents and disturbances. The [Department of Energy](#) uses the information to fulfill its overall national security and other energy emergency management responsibilities, as well as for analytical purposes. The [US DOE's Office of Electricity Delivery and Energy Reliability](#) has a number if publications on their website that discuss emergency situations, [emergency](#)

[preparedness and emergency response](#) which could be useful in developing information on previous and proposed disruptions. Unlike other sources of energy, electricity cannot be stored, it must be used upon generation. However, raw materials such as coal can be stored. Disruptions in coal delivery from railroad or barge issues could reduce the generation of electricity or move generation to more expensive sources such as natural gas.

### ***Renewable Energy***

Significant weather events may destroy solar panels, or power lines connecting renewable energy sources such as windmills or the windmills themselves. Feasibility studies have been performed on the equipment, but extreme weather events will impact these structures and should not be ruled out. Weather data should be monitored, potentially even automated for conditions with potential for destruction of wind mills or solar panels. Also, to a lesser extent, long periods of low winds or cloud cover may affect the amount of energy available from these sources. If the state begins to rely more heavily on these sources for electricity generation, these disruptions in supply need to be considered. Likewise, reductions in corn yield or soybean production from off-weather years could reduce the supply of ethanol and bio-diesel. Sites that predict corn and soybean yield need to also be monitored such as the USDA's [National Agricultural Statistics Service](#).

### ***Risk Assessment***

Once a comprehensive list of historical and potential disruptions has been developed, a risk assessment will be developed for each disruption scenario. A weighted scale will be applied with a score for each possible negative outcome that could result from the disruption. Industry input will be solicited. Disruptions will be categorized from low impact and low risk to high impact and high risk (Figure 7). Based on a consensus by the various state agencies involved in the energy assurance decision making process, levels of risk and corresponding activities will be established. A decision on when the state will become involved will be made and documented in a Supply Disruption Tracking Database. Considerations for impact will include population affected, potential length of disruption, effect on industry and the economy and impact to state security. Considerations for risk include determining the likelihood of the event based on prevention measures in place, replacement sources and previous occurrences of the event. For instance, a loss of electricity to 5,000 people after a thunderstorm would be high risk but low impact so the state would most likely not be involved. However, a power outage involving multiple cities would most likely require action by state and local government. Guidelines will

be established and published online and in pamphlet form for use by all involved parties identifying potential disruptions, the proposed risk and impact of these disruptions and when, potentially the state would become involved.

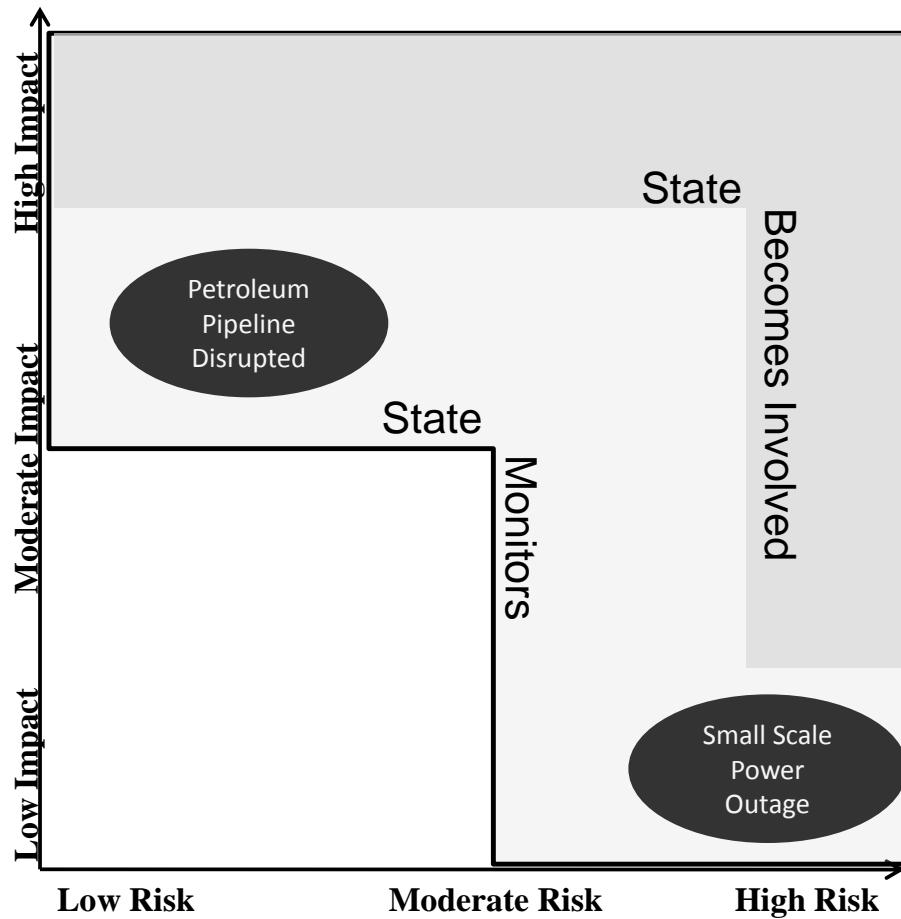


Figure 7. Simple Description of Risk and Impact Assessment for Different Disruptions

#### IV. Implementation of a Supply Disruption Tracking Process

##### *Management Decision Process*

The final step in the disruption and restoration tracking process will be the development of a management decision process for each energy source and each potential disruption for that energy source. The person responsible for monitoring the supply and/or disruption within the state of Illinois government and private sector will be identified. If a person cannot be currently identified, this gap will be notated, and efforts will be made by the state to put a person in place. Also, in the management plan will be a list of the largest consumers that will need to be contacted in case of a disruption to their location.

### ***Situational Awareness***

Once the appropriate individual or group of individuals is identified for monitoring for supply disruptions, situational awareness will be developed through a series of events. A list of sources will be developed and automated email will be sent to this person with either web page links or results from these web pages so they can quickly access the information necessary to monitor the energy supply for longer term disruptions from price and supply changes. For instance, the state agency personnel responsible for monitoring for petroleum supply disruptions will receive weekly and daily emails that access web pages containing gas prices, oil prices and other sources of information on supplies. If feasible in the state budget, this person will quickly compile a weekly report to be submitted to the State Energy Officer. The person will also be trained in situational awareness, energy supply disruption tracking, the use of iCAV and other infrastructure related software and communication of these events to ensure they are prepared to monitor for and respond to energy supply disruptions for their energy source. The state of Illinois has not made a decision on whether one individual and/or agency will be responsible for monitoring and responding to disruptions or if it will be people from multiple state agencies based on the source being monitored. This decision will be made before the completion of the Energy Reference Guide and any training exercises.

There will be four stages associated with supply disruption tracking. These stages are taken directly from the Michigan Supply Disruption Tracking Plan as the state Of Illinois was allowed to review this document and found these stages to capture the modes of awareness for energy supply disruption tracking quite well. These stages include 1) monitoring for a disruption 2) elevated risk 3) Event triggered 4) Recovery and lessons learned.

**Monitoring for a disruption:** Using the information sources and automated emails described above, the person or persons responsible for monitoring the supply, demand and infrastructure for each energy source (petroleum, natural gas, electricity, ethanol) will review this data and using their training, monitor for changes which are indicative of reductions in supply, increases in demand or a failure in the infrastructure. Using the supply disruption tracking database risk assessment, the analyst should be able to understand when a change warrants state involvement

and what that involvement should be. This person will be responsible for a weekly or monthly report to the State Energy Office.

**Elevated Risk:** It should be understood, that there will be times when a developing circumstance warrants heightened analysis of supply, demand or infrastructure but not direct state involvement; a developing hurricane, a crisis in the Middle-east, a heightened DHS security level or an extended heat wave are examples of these situations. In these situations, the analyst will spend additional time monitoring for changes specific to the identified risk and send daily reports to the energy office. Additional analysts may also be involved.

**Event Triggered:** A disruption in energy supply can be sudden, as when a pipeline breaks, or occur after a period of elevated risk such as a hurricane hitting the US Gulf Coast and disrupting petroleum supply (see reporting a disruption below). When an event is triggered, the analyst will begin full time monitoring. Once the extent of the event is determined to be at the level justifying state involvement, the analyst will contact the State Energy Office. The State Energy Office will then make the decision as to who additional is contacted. For instance, the Illinois Emergency Management Agency and the Governor's office may be contacted along with private energy providers, federal government agencies as appropriate and local authorities that may be effected by the disruption. See below section for further instructions on communications with media and policy makers.

**Recovery and Lessons Learned:** Once a significant event has occurred, the state will assist the private energy providers as necessary for the restoration of services. Communicate with the providers and federal agencies to determine if alternative energy sources or infrastructure needs to be diverted (for instance state reserves of oil or emergency reserves of ethanol after a crude oil pipeline disruption). After energy supply is restored, the state analyst and energy office will compile a report which defines the disruption, determines any steps that may have averted the supply and any restoration services which could have been performed better and provide this report to the governor's office and the private energy providers.

### ***Reporting a Disruption***

A clear pathway for reporting of disruptions from private entities, emergency management personnel, first responders and others who first discover the disruption to the necessary state agency personnel and private entity personnel who will then contact additional support will also be identified (Figure 8). The management decision process will also include a set of criteria by which disruptions are validated and a clear set of recommendations for actions based on the energy source, the disruption and the severity of the disruption. Again, if a disruption is not too severe, the private sector will be responsible for restoration.

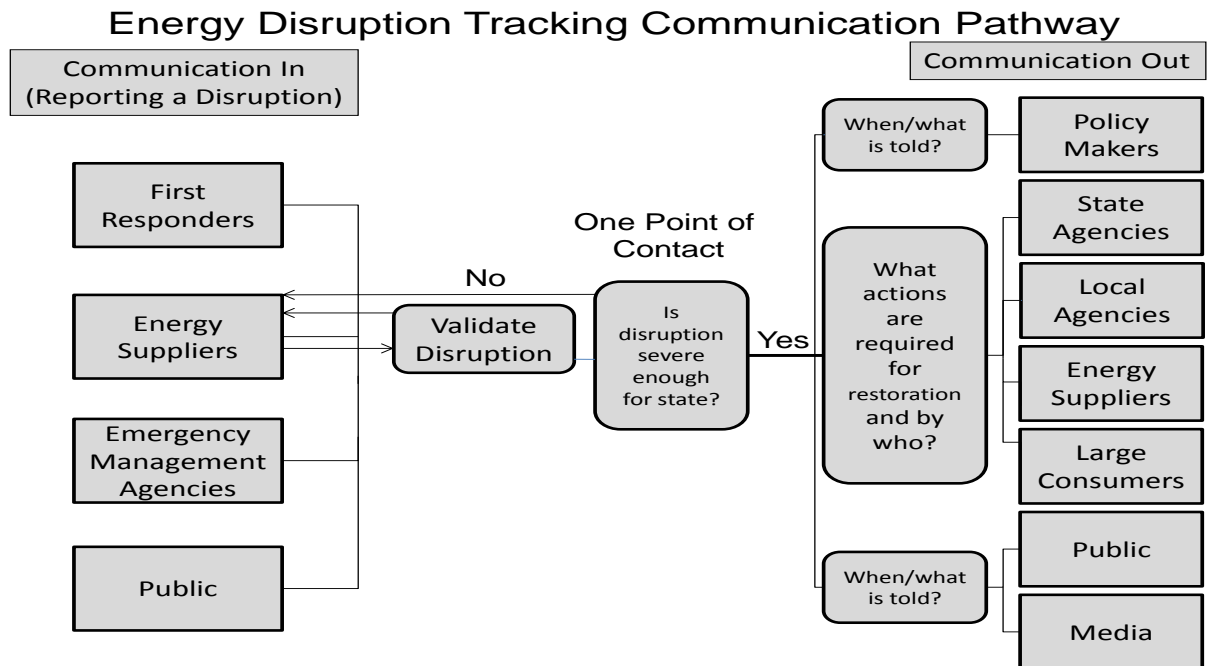


Figure 8. Within-state Communication Pathway for Energy Disruption Restoration

### ***Communications during a Disruption***

The final phase of the management decision process will regard communication to and from policy makers and the media. A person or persons from multiple agencies will be identified in the plan. This person(s) will be responsible for all communication with the media and/or policy makers regarding the release of information, request for assistance etc. in regards to the disruption. The management decision process will be posted on the internet clearly identifying the appropriate contacts for given scenarios and their contact information (addendum 3). The appropriate private industry representatives will be provided with the list and encouraged to notify the appropriate analyst to report a disruption and indicate restoration plans.



## V. Example Supply Disruption Tracking Scenarios

### *Scenario One: Crude Oil Pipeline Disruption*

In this scenario, a crude oil pipeline delivering oil to a Chicago refinery is disrupted. This is a sudden disruption. There were no events leading up to the disruption that would have indicated its occurrence. The situation goes from standard monitoring to event triggered (Figure 9). The event is reported from the company that operates the pipeline to the appropriate state official. The company estimates the disruption is going to reduce the production of petroleum products by 20% for several weeks while the pipeline is repaired, not only to the state of Illinois but to surrounding states. The first question the analyst asks is the impact great enough for state involvement. If not, the analyst will monitor the situation in an elevated risk mode until the pipeline is restored or disruptions become more severe. If it is decided, the impact of the situation warrants state involvement, the State Energy Office will be notified. The Energy Office will then decide whether the media and policy makers need to be notified. If it is decided, communication is appropriate, the Office will contact the appropriate representative of the governor's office, the Illinois Emergency Management Office and the private company involved in the disruption for an emergency conference call. During the call, decisions will be made upon a further review, as to whether the media should be contacted and whether the state should offer resources and/or energy supplies to mediate the situation such as releasing state oil reserves or asking the ethanol industry for emergency supplies of ethanol. If nothing else, actions such as these from the state may alter public perception of the severity of the event and make the public feel that the state is doing something to help.

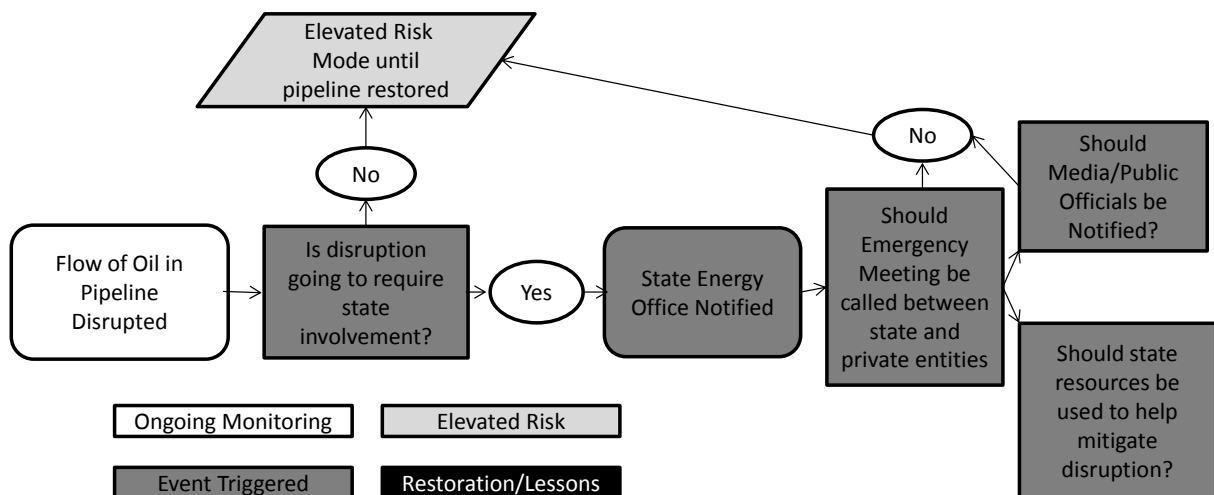


Figure 9. Flow chart for decisions associated with supply tracking from oil pipeline disruption

### ***Scenario Two: Hurricane in Gulf of Mexico Disrupts***

Under this scenario, prolonged monitoring will be required as a hurricane will be entering the Gulf of Mexico. Gulf oil wells will shut down production as a hurricane approaches disrupting supplies of crude oil to the state of Illinois and causing a real supply interruption or at a minimum increasing gasoline prices from a perceived disruption. State monitoring and effective communication can help alleviate citizen and policy maker concerns. The analyst will begin the process by monitoring for signs of a hurricane developing in the Gulf or moving in to the Gulf from the Atlantic. Many weather websites such as [Weather Underground](#) and the [Weather Channel](#) monitor tropical weather and the development and modeled trajectory of storms. Once a tropical depression has been identified and has moved in to the Gulf causing wells to stop production, the analyst will begin to monitor petroleum supplies for the number of days of supply and communicate with private sector providers of petroleum to the state. The analyst will also monitor commercial sites such as [gasbuddy.com](#) to determine if gas prices are going up around the state. If the storm intensifies and appears to threaten long term production, the analyst will notify the state energy office. The state energy office will then monitor the situation and make a decision on when to contact the media and the governor's office. A quick press release to the media notifying that the state is prepared to release oil reserves and monitor for unnecessary price increases by gas stations may allay concerns by citizens and keep gas prices down while the situation is monitored. If there is damage to oil wells in the Gulf significant enough to disrupt long-term supplies and impact days of supply, the state energy office and governor's office will determine the appropriate steps at the appropriate times to help control the situation.

Acknowledgements: This Energy Supply Tracking Process Plan has benefited significantly from a review of a draft of the *2010 State of Michigan Energy Supply Disruption Tracking Process Plan* and the National Association of Energy Officials Energy Assurances Guidelines version 3.1.

## **Addendum One: Information Sources**

### ***Ongoing Monitoring (Supply, Demand and Infrastructure)***

#### **All Sources**

DHS iCAV infrastructure GIS connection site

[http://www.dhs.gov/files/programs/gc\\_1217445858859.shtm](http://www.dhs.gov/files/programs/gc_1217445858859.shtm)

EIA Energy Assurance Daily

<http://www.oe.netl.doe.gov/ead.aspx>

EIA – Illinois Energy Profile

[http://tonto.eia.doe.gov/state/state\\_energy\\_profiles.cfm?sid=IL](http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=IL)

EIA – Short Term Energy Outlook

<http://www.eia.doe.gov/emeu/steo/pub/contents.html?featureclicked=1&>

EIA – Annual Energy Outlook

<http://www.eia.doe.gov/oiaf/aeo/index.html>

EIA – International Energy Outlook

<http://www.eia.doe.gov/oiaf/ieo/index.html>

#### **Electric**

Electric Power Monthly Use Report

[http://www.eia.doe.gov/cneaf/electricity/epm/epm\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html)

DOE Quarterly Coal Report

[http://www.eia.doe.gov/cneaf/coal/quarterly/qcr\\_sum.html](http://www.eia.doe.gov/cneaf/coal/quarterly/qcr_sum.html)

US EPA eGRID electrical grid information website

<http://cfpub.epa.gov/egridweb/>

EIA – Illinois’ Electricity Profile

[http://www.eia.doe.gov/cneaf/electricity/st\\_profiles/illinois.html](http://www.eia.doe.gov/cneaf/electricity/st_profiles/illinois.html)

EIA – OE 417 Major Electric Disturbances & Unusual Occurrences YTD (Table B.1)

<http://www.eia.doe.gov/cneaf/electricity/epm/tableb1.html>

NERC Electric Sector Threat Advisory Level

<http://www.nerc.com/page.php?cid=6|69|312>

NERC Awareness Bulletins

<http://www.nerc.com/page.php?cid=6|69|313>

## **Petroleum**

EIA Petroleum Publications Website

[the http://tonto.eia.doe.gov/dnav/pet/pet\\_pub\\_publist.asp](http://tonto.eia.doe.gov/dnav/pet/pet_pub_publist.asp)

American Petroleum Institute Statistics Page

<http://www.api.org/statistics/>

AAA Fuel Gauge Report

<http://www.fuelgaugereport.com/>

## **Natural Gas**

EIA Natural Gas Monthly Report

[http://www.eia.doe.gov/oil\\_gas/natural\\_gas/data\\_publications/natural\\_gas\\_monthly/ngm.html](http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.html)

Illinois Commerce Commission Annual Report on Natural Gas Use and Companies

<http://www.icc.illinois.gov/reports/Results.aspx?t=1>

Illinois Commerce Commission Annual Report on Natural Gas Prices

<http://www.icc.illinois.gov/publicutility/salesstatistics.aspx?t=g>

NYMEX Henry-Hub Natural Gas Price

<http://www.oilenergy.com/1gnymex.htm>

Henry Hub Gas Futures & City Gate Physical Gas Prices

<http://www.enerfax.com>

## **Renewable**

EIA State Renewable Energy Profiles

[http://www.eia.doe.gov/cneaf/solar.renewables/page/state\\_profiles/r\\_profiles\\_sum.html](http://www.eia.doe.gov/cneaf/solar.renewables/page/state_profiles/r_profiles_sum.html)

Biorefinery locations

<http://www.ethanolrfa.org/bio-refinery-locations/>

Potential Electricity Generation from Wind Map

[http://www.windpoweringamerica.gov/wind\\_resource\\_maps.asp?stateab=il](http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=il)

Current Wind Energy Project

<http://www.awea.org/>

## ***Emerging Potential Event***

### **All Sources**

DOE – OE ISER Report Energy Assurance Daily (EAD)

<http://www.oe.netl.doe.gov/ead.aspx>

EIA – State Energy Data System: Illinois

[http://www.eia.gov/state/state\\_energy\\_profiles.cfm?sid=IL](http://www.eia.gov/state/state_energy_profiles.cfm?sid=IL)

Energy Assurance Guidelines, Volume 3.1

<http://www.naseo.org/eaguidelines/>

Geographic Information System (GIS) – iCAV & DHS Earth

<https://icav.dhs.gov/>

<https://icav.dhs.gov/dhsearth/>

NOAA National Weather Service Heating & Cooling Degree Days

<http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html>

Hurricane Information – Bureau of Ocean Energy Management, Regulation, & Enforcement

<http://www.gomr.mms.gov/homepg/whatsnew/hurricane/index.html>

National Tropical Storm and Hurricane Warnings

[www.wunderground.com/tropical](http://www.wunderground.com/tropical)

## **Electric**

FERC Midwest Electric Power Markets

<http://www.ferc.gov/market-oversight/mkt-electric/midwest.asp>

NERC Alerts

<http://www.nerc.com/page.php?cid=5|63>

NERC Energy Emergency Alerts

<http://www.nerc.com/page.php?cid=5|65>

NERC Reliability Assessments

<http://www.nerc.com/page.php?cid=4|61>

NERC System Performance Indicators

<http://www.nerc.com/page.php?cid=4|37>

NERC Annual System Disruption Reports

<http://www.nerc.com/page.php?cid=5|66>

EIA – Electric Power Flash

<http://www.eia.doe.gov/cneaf/electricity/epm/flash/flash.html>

EIA – Electric Power Monthly

[http://www.eia.doe.gov/cneaf/electricity/epm/epm\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html)

EIA – Electric Power Annual

[http://www.eia.doe.gov/cneaf/electricity/epa/epa\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html)

EIA – Wholesale Market Data

<http://www.eia.doe.gov/cneaf/electricity/wholesale/wholesale.html>

EIA – Coal Fuel Data

<http://www.eia.doe.gov/fuelcoal.html>

Reports:

1. Coal News & Markets
2. Weekly Coal Production
3. Weekly Nymex
4. Monthly Energy Review, Coal
5. Quarterly Coal Report
6. Quarterly Coal Distribution
7. Annual Coal Report
8. Annual Coal Distribution
9. Annual Energy Review, Coal

Analysis:

1. U.S. Coal Supply & Demand
2. Coal Production in the US
3. Coal Transportation Information
4. Contract vs Spot Market Prices

EIA – Generation Capacity & Plant Availability (Power Plant Inventory in the United States)

<http://www.eia.doe.gov/cneaf/electricity/page/eia860.html>

High-Impact, Very Low Probability Risks

<http://www.nerc.com/page.php?cid=6|69|327>

FERC Coal Shipment Origins by Supply Basin by State

<http://www.ferc.gov/market-oversight/mkt-electric/midwest.asp#gen>

## **Petroleum**

American Petroleum Institute

<http://www.api.org/statistics/supplydemand/index.cfm>

Gasbuddy.com

[www.GasBuddy.com](http://www.GasBuddy.com)

EIA - General Petroleum Publications Homepage

<http://www.eia.gov/petroleum/>

EIA - This Week in Petroleum

<http://www.eia.doe.gov/oog/info/twip/twip.asp>

EIA - Petroleum Navigator - Home page

[http://www.eia.doe.gov/dnav/pet/pet\\_sum\\_top.asp](http://www.eia.doe.gov/dnav/pet/pet_sum_top.asp)

EIA - Weekly Petroleum Status Report

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/weekly\\_petroleum\\_status\\_report/wpsr.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/weekly_petroleum_status_report/wpsr.html)

EIA - US Weekly Gasoline Prices by Region

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/wrgp/mogas\\_home\\_page.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_home_page.html)

EIA - Weekly Retail On-Highway Diesel Prices

<http://www.eia.doe.gov/oog/info/wohdp/diesel.asp>

EIA - Gasoline & Diesel Fuel Update

<http://www.eia.doe.gov/oog/info/gdu/gasdiesel.asp>

EIA - Market Assessment of Planned Refinery Outages

[http://www.eia.doe.gov/pub/oil\\_gas/petroleum/feature\\_articles/2010/outage2010a/outage2010a.html](http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2010/outage2010a/outage2010a.html)

EIA - Company Level Imports

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/company\\_level\\_imports/cli.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/company_level_imports/cli.html)

EIA - Petroleum Marketing Monthly

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/petroleum\\_marketing\\_monthly/pm.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pm.html)

EIA - Petroleum Supply Monthly

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/petroleum\\_supply\\_monthly/psm.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html)

EIA - Prime Supplier Report

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/prime\\_supplier\\_report/psr.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html)

EIA - Heating Oil & Propane Update

<http://www.eia.doe.gov/oog/info/hopu/hopu.asp>

EIA - Refinery Capacity Report

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/refinery\\_capacity\\_data/refcapacity.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/refinery_capacity_data/refcapacity.html)

### ***Event Triggered***

Same as above, plus:

### **All Sources**

DOE Emergency Situation Reports

[http://www.oe.netl.doe.gov/emergency\\_sit\\_rpt.aspx](http://www.oe.netl.doe.gov/emergency_sit_rpt.aspx)

DHS Open Source Energy Sector Report

[http://www.dhs.gov/files/programs/editorial\\_0542.shtm](http://www.dhs.gov/files/programs/editorial_0542.shtm)

## **Electric**

Illinois Commerce Commission Annual Report on Electricity Reliability in the State

<http://www.icc.illinois.gov/electricity/electricreliability.aspx>

Ameren Electrical Outage Map

<https://www2.ameren.com/outage/outagemap.aspx?state=IL>

MISO & PJM updates & Locational Marginal Pricing Information

<http://www.ferc.gov/market-oversight/mkt-electric/midwest/miso-rto-dly-rpt.pdf>

DOE – OE 417 Form (Electric Disturbance Event) (Table B.1)

<http://www.eia.doe.gov/cneaf/electricity/epm/tableb1.html>

EIA Federal Electrical Emergency

[http://www.eia.doe.gov/cneaf/electricity/page/disturb\\_events.html](http://www.eia.doe.gov/cneaf/electricity/page/disturb_events.html)

## **Petroleum**

Minerals Management Service Updates (gulf disruption events)

<http://www.gomr.mms.gov/homepg/whatsnew/hurricane/index.html>

## **Natural Gas**

Minerals Management Service Updates (gulf disruption events)

<http://www.gomr.mms.gov/homepg/whatsnew/hurricane/index.html>

## **All Sources**

Coordinate with utility companies

## ***Disruptions***

### **Petroleum**

[http://www.eia.doe.gov/oil\\_gas/petroleum/data\\_publications/petroleum\\_supply\\_monthly/psm.html](http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html)

### **Natural Gas**

Natural gas disturbance modeling software from Argonne

<http://www.dis.anl.gov/projects/ngfast.html>

GAO Natural gas pipeline safety report to Congress

<http://www.gao.gov/new.items/d06945.pdf>

### **Electric**

DOE Electric Disturbance Events Report

<http://www.oe.netl.doe.gov/oe417.aspx>

Federal Electric Event Emergency Alert and Incident Report

[http://www.eia.doe.gov/cneaf/electricity/page/disturb\\_events.html](http://www.eia.doe.gov/cneaf/electricity/page/disturb_events.html)

DOE emergency situations report for electricity

[http://www.oe.netl.doe.gov/emergency\\_sit\\_rpt.aspx](http://www.oe.netl.doe.gov/emergency_sit_rpt.aspx)

### **Renewables**

Yields and Crop Predictions for Corn and Soybeans

<http://www.nass.usda.gov/>

## Appendix 2: Illinois State Tracking Supply Disruption Database

### Illinois Energy Supply Disruption Tracking Database

Event	Date	Type	Duration	Areas Impacted	# of Customers Impacted	Companies Impacted	State Agencies Involved	Private Sector Involved

SEO Contacted?	Media Contacted?	Governors Office Contacted?	State Resources Used (what)?	Actions Taken	Impact of Actions	Lessons Learned	Comments

**Appendix 3. Contacts for State Energy Assurance (Phone numbers removed for privacy but are available on internal document)**

<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>	<b>Role</b>
Aquino	Reynaldo	Chicago Dept. of Environment	local government
Arendt	Michael	Integrays (Peoples Gas)	Industry-natural gas
Bensko	Robert	Illinois Commerce Commission	state government- emergency management
Borgia	Kevin	Illinois Wind Energy Association	industry- renewables- wind
Boss	Terry	Interstate Natural Gas Association of America	industry- natural gas
Bronson	Ted	Power Equipment Associates	industry- renewables- CHP
Burk	Darin	Illinois Commerce Commission	state government- monitoring
Carnduff	Brad	Illinois State Police	State government- first responders
Chittim	Ron	American Petroleum Institute	industry- petroleum
Claude	Beth	Enbridge Energy Co.	industry- petroleum pipeline
Cobau	Ed	IMUA	industry- electric
Coleman	Terry	Shell Pipeline Company	industry- petroleum
Colarelli	Peter	Citgo	industry- petroleum
Conzelmann	Gunter	Argonne/Infrastructure Center	federal government- infrastructure
Copenhaver	Ken	UIC ERC	UIC
Corr	Valerie	BP Whiting Refinery	industry- petroleum
Cummins	Bill	DHS Infrastructure Protection	federal government- infrastructure
Defenbaugh	Ray	Illinois Renewable Fuels Association	industry- renewables- biofuels
Deppolder	Dwain	City of Peoria Fire Dept	local government
Dougherty	Laurie	Illinois Section AWWA	industry- user
Doris	Mark	Marathon Petroleum	Industry=emergency response
Dragoo	Darryl	IEMA	state government- emergency management
Dwyer	Martin	IEMA	state government- emergency management
Eichholz	Dan	Illinois Petroleum Council	industry- petroleum
Fairow	Jana	IEMA	state government- emergency management

Fleschie	Bill	Illinois Petroleum Marketers Association	industry- petroleum
Fox	Daniel	NICOR	industry- natural gas
Frazier	Barry	Center Ethanol	industry- biofuels
Fridgen	Jon	Monsanto	industry- biofuels
Griffin	John	API	industry- petroleum
Griffis	Carl	PHMSA Central Region Office	federal government- infrastructure
Haas	Rick	Conoco Phillips Wood River Refinery	Industry-petroleum
Haley	Tim	Marathon Oil	industry- petroleum
Halting	Judd	Patriot Ethanol	industry- biofuels
Helhowski	Jim	Enbridge/Vector	industry- petroleum
Hoots	Diane	Illinois Central Management Services	State government- emergency management
Isbell	Chris	County Engineer, Stephenson County	state government- first responders
Johnson	Hilary	Witt Associates	industry- plan preparers
Kadansky	Richard	Marathon Petroleum	industry- petroleum
Kauerauf	Don	IEMA	State government- emergency management
Kenel	Mike	state of Michigan PUC	state government- other
Korty	Tom	IDOT	State government- emergency management
Lippert	Alice	US Department of Energy	federal government- supervising
Lloyd	Byron	DCEO	state government
Marek	Norm	DCEO	state government- renewables
Martino	Maggie	Tri-county Regional Planning Commission	local government
Marx	Michael	Ameren	industry- electric
Mathias	Richard	PJM	industry- electric
McAvoy	Mick	Illinois Law Enforcement Alarm System	state government- first responders
Moore	Kristy	Renewable Fuels Association	industry- renewables- biofuels
Mueller	Steffen	UIC ERC	UIC
Naillon	Dean	Integrays Energy Services	industry- natural gas
Nania	John	Nania Energy	industry- natural gas
Narilwala	Rajiv	IL DCEO	State government-energy assurance engineer
Osgood	Robert	Commonwealth Edison	industry- electric
Pillon	Jeff	NASEO	federal government- supervising
Plant	Robert	Commonwealth Edison	industry- electric

Puracchio	Thomas	Integrays (Peoples Gas)	ndustry- natural gas
Raburn	Janice	BP Products	industry- petroleum
Reardon	Jay	CEO MABAS-IL	state government- first responders
Richardson	Joe	Enbridge Pipeline	Industry- petroleum pipelines
Rybarczyk	Ron	BP Oil	industry- petroleum
Samsa	Michael	Argonne/Infrastructure Center	federal government- infrastructure
Schlicher	Martha	Monsanto Bioenergy	industry- renewables- biofuels
Scott	Don	National Biodiesel Board	industry- renewables- biofuels
Shaff	Nick	Midwest Energy Inc	industry- natural gas
Simpson	Tricia	Exxon Mobil Joliet Refinery	industry- petroleum
Smith	Keith	Shell Pipeline Company	Industry- petroleum pipelines
Smith	Paul	IEMA	state government- emergency management
Snedic	Ron	Gas Technology Institute	industry- natural gas
Strutz	Jim	Springfield City Water Light and Power	industry- user
Sykuta	David	Illinois Petroleum Council	industry- petroleum
Talaber	Leah	Argonne/Infrastructure Center	federal government- infrastructure
Thompson	Trenton	IEMA	State government- emergency management
Ulanday	Fred	People's Gas	industry- natural gas
Voiles	Jackie	Ameren Illinois	industry- electric
Walas	Fred	Marathon Petroleum	Industry- petroleum
Watson	Ryan	US Department of Energy	federal government- supervising
Winnie	Harold	PHMSA Central Region Office	federal government- infrastructure
Woodin	Dale	American Hospital Association	state government- users
Wolf	Tom	Illinois Chamber of Commerce	
Wulfkuhle	Gus	FEMA Region 5	federal government- emergency management
Weiss	Greg	Ameren	industry-electric

## Appendix 4. State Energy Fact Sheets

### State of Illinois Energy Fact Sheet | Electricity



DCEO | IEMA | ICC

#### Production and Consumption

- Illinois exports generated excess electricity to other states
  - Illinois ranks first in the country in nuclear generated electricity (24% of the energy used in Illinois is from nuclear generated electricity)
  - Illinois has large coal reserves but their use is limited by high sulfur content (the state imported 94% of the coal it used in 2008 for electrical generation)
  - Over 95% of the state's electricity is generated by coal or nuclear.
  - Electricity generated from wind and solar is intermittent while traditionally generated electricity is continuous.
- Natural gas fired power plants can be used in conjunction with smart grid technology to compensate for these changes.



Utility	Location	Customers
Ameren Illinois	Central and Southern	1,197,805
Commonwealth Edison Co.	Northern	3,801,999
Mid-American Energy Co.	Northwestern	84,677
Mt. Carmel Public Utility Co.	Southern	5,489

Investor-owned electrical utilities in Illinois and the number of their customers

Locations of Nuclear Power Generating Facilities in Illinois

Primary Fuel Source	# of Facilities	Plant Annual Generation (MWh)	% of Total
Nuclear	6	93,263,000	48.04%
Sub-bituminous Coal	17	79,400,000	40.90%
Bituminous Coal	13	13,300,000	6.85%
Natural Gas	71	7,084,000	3.65%
Landfill Gas	24	636,000	0.33%
Process Gas	1	151,000	0.08%
Wind	2	141,000	0.07%
Water	6	76,000	0.04%
Distillate/Diesel Oil	34	64,000	0.03%
Digester Gas	3	40,000	0.02%
Totals	177	194,155,000	100%

State of Illinois  
Energy Assurance  
Workshop

April 11, 2012

## State of Illinois Energy Fact Sheet | Natural Gas



DCEO | IEMA | ICC

- Illinois uses 939,970 million cubic feet (mcf) of natural gas annually (3.9% of US total)
- Illinois is second to only Michigan in underground storage capacity of natural gas (almost 1 million mcf)
- Only about 2% of Illinois' electricity is generated from natural gas
- More than 80% of Illinois homes are heated with natural gas
- The only natural gas market centers (hubs) in the midwest for interstate pipelines are found in Illinois (Chicago and Joliet)
- Illinois is 27th in natural gas production in the US producing 1,203 mcf in 2010
- Small natural gas fired electrical generating plants can be used to compensate for the intermittent nature of wind generated electricity or for peak usage times.



Utility Name	Location in Illinois	# of Customers
Ameren	Central and south	814,773
Atmos Energy Corporation	South	22,498
Consumers Gas Company	South	5,540
Illinois Gas Company	South	9,723
Mt. Carmel Public Utility Company	South	3,574
Nicor Gas Company	Northern	2,172,724
North Shore Gas Company	Northern	158,001
Peoples Gas Light and Coke Company	Northern	821,902
MidAmerican Energy Company	Northern	65,542

State of Illinois  
Energy Assurance  
Workshop

April 11, 2012

## State of Illinois Energy Fact Sheet | Renewables

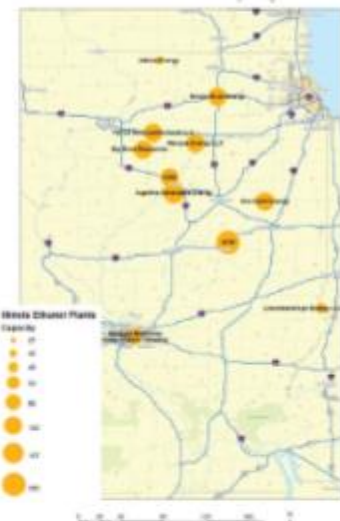


DCEO | IEMA | ICC

- Illinois has a standard to produce 25% of energy consumed by the state from renewable sources by 2025.  
Seventy five percent of this needs to come from wind.
- The current net summer capacity for Illinois wind generated electricity is 4.4% of the total used in the state.
- Illinois is 4th in the country in wind-farm capacity.
- Illinois generates enough wind energy to power over 1,000,000 homes
- All of Illinois' wind farms are north of Springfield.
- An often overlooked source of re-usable energy is Combined Heat and Power (CHP) which re-uses heat generated in by buildings or industrial processes to create electricity.
- CHP could produce 3,000 to 8,000 megawatts of electricity in the state with an additional 3,000 from agricultural sources.
- Illinois produces over 1,284 million gallons of ethanol a year (replacing almost 100 million tanks of gasoline).
- Illinois is third behind Iowa and Nebraska in ethanol production.



Locations of Industrial Wind Turbines in Illinois



Biorefinery locations in Illinois

State of Illinois  
Energy Assurance  
Workshop

April 11, 2012

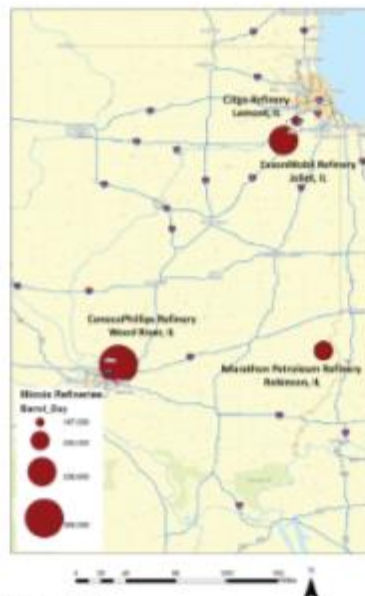
## State of Illinois Energy Fact Sheet | Petroleum



DCEO | IEMA | ICC

- Illinois is 14<sup>th</sup> in petroleum production in the US (was 5<sup>th</sup> up until the early 1970s)
- State refineries process about 917,600 barrels a day while the state consumes just under 700,000 barrels
- The majority of oil wells in Illinois produce about 1.5 barrels a day (equivalent to 63 gallons of gasoline)
- The state imports the vast majority of its petroleum from Canada.
- Petroleum is transported to Illinois exclusively from pipelines.
- Ninety-five percent of Illinois gas stations are privately owned.
- Biggest threat to Illinois oil supply is electricity outages in Gulf which will stop pumping of oil).

Name	Company	Barrels Per Calendar Day
Lemont Refinery	Citgo	167,000
Joliet Refinery	ExxonMobil	238,600
Robinson Refinery	Marathon Petroleum	206,000
Wood River Refinery	ConocoPhillips	306,000
<b>Total</b>		<b>917,600</b>



Illinois refineries



State of Illinois  
Energy Assurance  
Workshop

April 11, 2012

## Appendix 5. GIS Database Layers and Attributes

### *Layers*

Energy Sectors	Infrastructure
<b>Electricity</b>	Utility Territories Transmission lines Distribution lines Sub-stations Generation Plants CHP Locations Outages Map
<b>Natural Gas</b>	Facilities (compressor stations, LNG terminals etc.) pipelines Interconnections
<b>Transportation Fuels</b>	Petroleum pipelines (crude and products) Refineries Facilities (pump stations, storage tanks etc.) Pump stations Interconnections Ethanol Plants Gas stations Petroleum Terminals
<b>Renewable Energy</b>	Gas stations with alternative fuels (E85 and biodeisel) Generation plants with renewable capabilities Wind Geothermal Waste
<b>Facilities for Restoration Priorities</b>	Biomass State facilities (prisons, nursing homes DCFS etc.) hospitals schools

### *Attributes*

Interconnections (NG and Oil)	Pipelines	Ethanol Plants
Name	Owner	Name
Type	Number of Owners	Capacity
Commodity	Leased	
Interconnection name 1	Operator	
Interconnection name 2	Commodity	
Interconnection name 3	Commodity2	
Gathering	Primary Batch	
Commodity 2	Secondary Batch	

Line type  
 System  
 Flow direction  
 Diameter  
 Last owner  
 last operator

**CHP Locations**

Facility Name  
 Application  
 Primary Mover  
 Capacity

Fuel Type

**CMS Gold List**

Address  
 Owner Agency  
 Site Name  
 Tenant Agency

Building Name  
 Building Use  
 Total Sq Ft

**Alternative Fuel  
 Stations**

Address  
 latitude, longitude  
 Name  
 Phone number  
 Access code (credit  
 cards)  
 Access hours  
 Credit cards accepted  
 Bio-diesel blends  
 NG fill type  
 NG PSI  
 Owner type

**Hospitals**

Name  
 Elevation

**Gas stations**

Address

**Institutions**

Name  
 Type

**Appendix 6. After Action Reports from Intrastate, Interstate and Municipality Exercises**

**State of Illinois  
After Action Report  
Midwest Interstate Energy Assurance Exercise  
August 31 and September 1, 2011**

## Contents

Attendees from the State Government of Illinois: .....	121
Attendees from State of Illinois LEAP Cities .....	122
General Observations on the Exercise: .....	123
Comments on the exercise itself: .....	123
General Strengths of the Exercise: .....	123
General Weaknesses of the Exercise: .....	124
General State Strengths Identified by the Exercise: .....	125
General State Weaknesses Identified: .....	126
Action Items: .....	126
Scenario One: Hackers take down SCADA equipment for natural gas and oil pipelines and electrical infrastructure .....	130
Energy Assurance Plan Strengths: .....	130
Energy Assurance Plan Weaknesses: .....	130
Action Items .....	130
Scenario Two: Ethanol Plants and Power Lines Destroyed by Domestic Terrorists- .....	131
Energy Assurance Plan Strengths .....	131
Energy Assurance Plan Weaknesses: .....	131
Action Items: .....	132
Scenario Three: Trucker Strike- .....	134
Energy Assurance Plan Strengths: .....	134
Energy Assurance Plan Weaknesses: .....	134
Action Items .....	135
Conclusions .....	137

**State of Illinois**  
**After Action Report**  
**Midwest Interstate Energy Assurance Exercise**  
**August 31 and September 1, 2011**

**Attendees from the State Government of Illinois:**

Robert Bensko  
Homeland Security Director/  
State Energy Emergency Assurance Coordinator  
Illinois Commerce Commission

Edie Casella  
Project Manager, Illinois Terrorism Task Force  
Illinois Emergency Management Agency

Kenneth Copenhaver  
Senior Research Engineer  
University of Illinois at Chicago

Martin Dwyer  
Exercise Training Officer  
Illinois Emergency Management Agency

Jonathan Fiepel  
Deputy Director  
Illinois Department of Commerce and Economic Opportunity

Byron Lloyd  
Energy Efficiency Program Administrator  
Illinois Department of Commerce and Economic Opportunity, State Energy Office

Karen May  
State Representative  
Illinois House of Representatives

Agnes Mrozowski  
Assistant Deputy Director  
Illinois Department of Commerce and Economic Opportunity

**Attendees from State of Illinois LEAP Cities**

Reynaldo Aquino (City of Chicago)  
Assistant Project Director, Energy Division  
City of Chicago

Nicolle Daily (City of Peoria)  
Senior Planner  
Witt Associates

Maggie Martino (City of Peoria)  
Planning Program Manager  
Planning Commission  
City of Peoria

Antonia Ornelas (City of Hoffman Estates)  
Shaw Environmental and Infrastructure

## **General Observations on the Exercise:**

### **Comments on the exercise itself:**

Everyone participating in the White Prairie Midwest Regional Energy Assurance Exercise from the state of Illinois was pleased with the entire exercise. The State personnel felt the exercise was well organized, well attended and very useful. Components of the State of Illinois Energy Assurance Plan (EAP) were well tested and strengths and weaknesses in the plan were clearly identified by the exercise. The state is in the process of addressing the identified weaknesses and will be implementing new information and methods into the EAP as they are addressed. Below is a review of the strengths and weaknesses within the EAP as they were identified during the exercise and in post-exercise state energy and emergency response personnel meetings. The strengths and weaknesses have been separated into those that were generally observed or identified during the general sessions or that were broader in scope and those specifically identified from the proposed scenarios and the corresponding breakout sessions. As in most after action reports, the weaknesses seem to outweigh the strengths and the state plans to address those weaknesses, but also wants to assure the reader that the existing draft of the plan contains its merits. Comments in this report are not intended to be judgmental towards anyone in attendance and are designed to assist in the development of a second draft of the plan which more strongly addresses the energy assurance needs of the state of Illinois.

### **General Strengths of the Exercise:**

- **One pagers:** The one page fact sheets provided by the Department of Energy, Argonne and others were very helpful and led to the state deciding to develop one page fact sheets for state energy sources and post those online. The one pager on petroleum was found to be especially informative.
- **Scenarios:** The Argonne group did a very good job of preparing and providing information on the scenarios. The scenario overviews provided the necessary background for the breakout sessions. The scenarios were obviously well thought out and were original, but also did an excellent job of testing components of the EAPs that may have weaknesses while not embarrassing the states or exploiting the weaknesses.
- **Presenters:** Each of the presenters was knowledgeable and gave timely and useful information. It was clear they were chosen for their expertise specific to components of the EAPs which may require more information. The state of Illinois participants learned something from each presenter that will result in action items for the second version of the EAP.
- **Cyber-security Presentation:** State participants commented that they were unaware of the extent of cyber-security risks especially for SCADA and mobile devices. It became

apparent that many private sector participants are actively pursuing cyber-threat counter measures with active communication and cooperation but are not, necessarily, sharing these with the states, and the states need to push to get involved and, perhaps, improve their own cyber-security measures.

- **Interdependencies Presentation:** This talk truly highlighted the extent of interdependencies with energy sources and infrastructure, and it was felt that the Illinois EAP should better define each of these. Some methods and means to categorize interdependencies described in the talk could be used in the state of Illinois EAP. The state intends to include these in the second version of the EAP.
- **FMCSA Presentation:** New information was obtained regarding the FMCSA and federal requirements for driver hour waivers and weigh-stations in the case of an energy emergency as they compare to, contradict or comply with state requirements. This was very helpful and the state will review their policies and regulations comparing them to the FMCSA regulations using the presentation as a guide.
- **Petroleum Presentation:** New information on pipeline flow, requirements and capacity was learned from the speaker from Marathon that will be added to the state's EAP. The speaker did an excellent job of explaining the time frame, mode and requirements for delivery of petroleum-based energy products.
- **Breakout Sessions:** The breakout sessions were well organized and the scenarios were well presented. Questions solicited by the break out session moderators were well thought out and elicited good responses. It was clear that State participants were reviewing their EAPs and realizing strengths and weaknesses during the breakout sessions, and that the scenarios and questions were intended to test the EAPs and their contents.

#### **General Weaknesses of the Exercise:**

- **Exercise Security:** Some state of Illinois participants commented that exercise document security could have been more rigorous in regards to the scenarios. Most scenario materials were kept confidential but others were in the handout packets.
- **Scenarios:** It would have been good to have, at a minimum, a white paper or bullets for each scenario for the breakout sessions. These could have been kept in the scenario rooms for security purposes but would have assisted during the sessions as it was not always possible to fully recall all of the timing and extent of the scenarios.

- **Breakout Sessions:** State personnel found the separation of groups for the breakout sessions a little confusing. The contractor preparing the EAP was in one breakout session while the State Energy Officer and the State Energy Emergency Assurance Coordinator (EEAC) were in a different breakout session and the IEMA Exercise coordinator was in a third. If the intent was to have everyone from the state in one session it would have made sense to have the contractor and the state agency personnel in that session. If the intent was to have the state experts in different sessions it may have made sense to separate the energy officer and the EEAC. Also in the breakout sessions, having people properly introduced and name tags with affiliation and title would have been helpful in keeping track of who was with what organization. Separating or more clearly defining those involved with EAP preparation versus those who were there from industry or not involved in plan development may have also assisted in the sessions.
- **Private Sector Perceptions:** The private sector participants made it clear that they have their own energy restoration plans and policies, that they take the lead in restoration, and that it is important that the states recognize this and simply aid when appropriate. It was also made clear by private sector participants that components of their security systems and emergency operations plans were proprietary and could not be shared with the public (although many indicated they would be willing to share information with the state if the state ensured safe keeping of the information). While it is not completely negative that the private sector takes this point of view, after all it is in their best interest to restore energy supplies as quickly as possible; this has led to difficulties in the state obtaining information and cooperation from some private sector energy providers. It was interesting to note that within Illinois, the private sector participants present are usually the most cooperative when the state requests information or participation in exercises.

#### **General State Strengths Identified by the Exercise:**

- **Chain of Command:** The EAP does do a good job of capturing the chain of command in the state of Illinois for an energy emergency. The plan identified agencies and individuals responsible for key a decision (for example: who opens the SEOC, who declares an emergency etc.) clearly and based on specific regulations or the State Emergency Operations Manual.
- **State Energy Use:** The EAP maps state energy uses and requirements quite well and details infrastructure quite well. This assisted state exercise participants when determining the extent of damage to Illinois energy supply and infrastructure from an energy emergency disruption.

- **Communications:** The EAP addresses appropriate lines of communication within state agencies and with the public. It addresses who within the state government speaks to the public and how and when this information is released, as well as how agencies communicate with each other and which agencies take the lead in energy emergencies.
- **Agency Responsibilities:** The EAP clearly delineates state agency responsibilities and roles within energy supply monitoring and disruption recovery.
- **Representation:** The state was well represented at the exercise including personnel from the Illinois Emergency Management Agency, the Illinois Terrorism Task Force, the Illinois Department of Commerce and Economic Opportunity, Illinois State Energy Office, the Illinois Commerce Commission (including the Commissioner) and the State Energy Emergency Assurance Coordinator. These represent the key stakeholders in state energy assurance.

#### **General State Weaknesses Identified:**

- **The EAP does not clearly define how the State will maintain situational awareness.**
- **Data Analysis:**
- **Petroleum**
- **The state needs to establish stronger relationships with the private**
- **Working with the Governor's Office.**
- **The EAP is not compliant with FEMA's Emergency Support Function 12**
- **The state has not done enough to integrate energy assurance efforts with other states.**
- **Interdependencies between shortages and/or disruptions in one energy supply and others not well defined in the plan.**
- **How do necessary restoration goods and materials get to the energy providers when needed after a disruption?**
- **State personnel could have more familiarity with the plan itself.**

#### **Action Items:**

- **The EAP does not clearly define how State will maintain situational awareness.** Develop short, specific white papers on each Illinois energy source which will be available online and in the EAP. The white papers will outline the sources, there strengths and weaknesses, vulnerabilities and links to more detailed information. The

state will more clearly define who is responsible for what components of situational awareness. State personnel will be identified that will monitor energy supplies, catalog disruptions and provide information to state energy emergency responders on supply, potential shortages and infrastructure. This may require additional, long-term funding by the state. The state will explore these costs and explore ways a State Energy Assurance Coordinator could be funded.

- **Data Analysis:** The supply disruption tracking plan outlines how monitoring for energy supply shortages/disruptions will occur, but more specific methods, and more specifically, a state representative and agency responsible for monitoring supplies is necessary. The State Energy Office has hired personnel who may take on the role of State Energy Assurance Coordinator and take on the task of monitoring energy supplies and potential disruptions. Also, as stated in the above action item, long term funding of this position will be explored.
- **Petroleum:** Some questions that came out of the exercise and after post-exercise meetings within the state of Illinois energy team were “Who within the state government is responsible for monitoring and responding to petroleum shortages?” “Does the state have any regulatory components which can effect petroleum pricing?” “What is the best way to inform the Governor on when it is appropriate to reduce or eliminate gasoline taxes?” “Does the state have a priority list for distribution of state contracted gasoline if a severe shortage were to occur?” and “How does the state decide if it is going to release any petroleum reserves in an effort to reduce prices and alleviate state citizen concerns?” The EAP will answer all of these questions by talking to the state’s Central Management Services which handles contracts, the Governor’s office and by studying state regulations in regards to gasoline and petroleum and provide the results of these inquiries in the second version of the EAP. The petroleum section of the second draft of the EAP will reflect these changes
- **The state needs to establish stronger relationships with the private sector:** The State of Illinois is developed a Business Emergency Operations Center (BEOC). The BEOC is planned to be very similar to the State Emergency Operations Center but with private sector participants filling the roles normally filled by state agencies at the SEOC. The state has actively recruited energy providers and suppliers to participate in the BEOC. As the BEOC continues to be developed, the state plans to develop the necessary relationships with private sector to initiate relationships of mutual trust and begin to better define what the private sector does in energy emergencies and requires from the state in energy emergencies. Meetings for the state BEOC are being held in October. The state also plans to interview additional private sector key stakeholders (not only in

the energy sector but large energy users) in energy assurance to better understand private sector needs, plans and areas where the state can assist. Additional information provided in the second draft of the EAP will reflect the new information obtained in these meetings.

- **Working with the Governor's Office.** The action items here include 1) Presenting to the State Emergency Operations Center on October 5<sup>th</sup> that the ICC would like to have the EAP included as an annex to the State Emergency Operations Manual (EOM) 2) Working the EAP through the Illinois State Level Exercise on November 15<sup>th</sup> to 17<sup>th</sup>, 2011. 3) Developing a 2<sup>nd</sup> draft of the plan by the end of 2011 which integrates the plan's language with the State EOM including working with the IEMA group that developed the State EOM 4) Testing the 2<sup>nd</sup> draft of the plan in March of 2012 via a tabletop energy assurance exercise 5) Presenting the new version of the plan with improvements after testing to IEMA for annex and to the IEMA Director for approval 6) IEMA, ICC and the State Energy Office presenting the key elements of the plan to the Governor's office for approval and, at that time, discussing outstanding issues with the Governor's office and ways in which energy assurance can assist the Governor.
- **The EAP is not compliant with FEMA's Emergency Support Function 12.** The state will review and attempt to make the EAP more compliant with ESF 12 along with other state operations. This will hopefully, not only make the state more compliant with FEMA's response methods but also other states. The state is integrating the EAP with the state Emergency Operations Manual. If all goes well, the three will integrate together, bringing the state emergency procedures more compliant with FEMA activities. These changes will be implemented into the second version of the EAP.
- **The state has not done enough to integrate energy assurance with other states.** The state plans to reach out to other states involved in the Midwest exercise and propose a follow up meeting to the exercise in the Spring of 2012 to discuss how each state EAP learned and grew from the exercise and how the states may be able to integrate more in the development of the plans. As discussed in the previous action, perhaps a tie-in to ESF-12 methods may allow state plans to come together. For the long term, the state energy office plans to work with other state officer to develop a means of permanent communication not only during crises but on a continuous basis so supplies can be monitored and potential shortages identified earlier by the group. The state energy office will be sending out invites to other Midwest state energy assurance coordinators and staff to a spring meeting late this year. The state will review the first draft of other Midwest State's energy assurance plans and work toward integrating common language and methods for the second version of the EAP.

- **Interdependencies between shortages and/or disruptions in one energy supply and others not well defined in the plan.** The state plans to develop an interdependency short report using some of the methods and categorizations outlined in the Midwest exercise presentation on interdependencies, as well as review other state plans and meet with private sector and municipality stakeholders involved in energy assurance to better understand interdependencies. The first version of the interdependencies report will be summarized in the EAP within the second draft of the EAP and included as an appendix.
  
- **How do necessary goods and materials get to the energy providers when needed after a disruption?** Discussions with state personnel involved in emergency response indicate that some of this information is available; it just needs to be studied and summarized by energy assurance personnel for the EAP. The state's Central Management Services handles contracts and purchasing for the state. Meetings with CMS will be held for a better understanding of how the state purchases and allocates resources in an emergency. A meeting will also be held with the state's Mutual Aid Box Alarm System (MABAS) which is a statewide (and growing in to other states) system designed to allow municipalities to share resources. Tying in to MABAS, may be a great way for the energy assurance state personnel to better understand current distribution of resources and how the state can better integrate available state resources. Meetings will also be held with municipalities including ongoing discussions with LEAP communities, to better understand resource requirements and allocations at the municipality level. Results from these discussions will be included in the second version of the EAP.
  
- **State personnel could have more familiarity with the plan itself.** I was clear from comments by state personnel at the exercise that the EAP was not properly disseminated after the completion of the 1<sup>st</sup> draft. The state will email the plan to all key stakeholders and provide a web page where the plan can be downloaded. Hard copies will also be mailed out to critical stakeholders. A list is being developed. In addition, the state will host a common working group meeting in March of 2012 along with the tabletop exercise. The second draft of the plan, after release at the end of 2011, will be widely disseminated to key stakeholders and state agencies.

## **Scenario One: Hackers take down SCADA equipment for natural gas and oil pipelines and electrical infrastructure**

### **Energy Assurance Plan Strengths:**

- **State of Illinois Cyber Security Report Requirements:** The Illinois Commerce Commission has required all state regulated utilities to develop and submit a cyber-security report. These reports have provided the state some good information on the current state of cyber-security for key state utilities.
- **State of Illinois Cyber Security Plan:** The state has also developed a cyber-security plan for state agencies and citizens. Components of this were included in the Energy Assurance Plan.
- **Plan documented extent and locations of pipelines:** The EAP had fairly thorough documentation on the locations, types and extent of pipelines within the state along with vulnerable pipeline confluences and hubs.

### **Energy Assurance Plan Weaknesses:**

- **Private Sector Software and Hardware:** The state does not have a clear idea of what software and hardware the private sector energy providers have and how this could be impacted by cyber threats. This is especially true for the petroleum industry and the pipeline companies which have less state regulatory control and have not provided information to the state. If the equipment is outdated or more vulnerable to cyber-threats, state energy assurance could be at greater risk.
- **Cyber-security for petroleum industry:** The state of Illinois has a large number of pipelines coming into and passing through the state as well as a number of refineries within and bordering Illinois, but the cyber-security of these pipelines and refineries are not known by the state.

### **Action Items**

- **Private Sector Software and Hardware:** Develop an inventory of software and hardware used by state utilities and other energy sector businesses. This is obviously a list that will have to be proprietary and not shared by the state, but the participating businesses' names can be provided. The state will also check with surrounding states to determine if this information has been compiled. This may give Illinois an idea of where to start, questions to ask and what may be within the state.

- **Cyber-security for petroleum industry:** While it is understood that the petroleum industry has no requirement to provide information on cyber-security efforts and equipment to the state, it is believed that the industry will be compliant based on previous work with this group. The state plans a series of meetings with the state refineries and pipeline companies and will develop a brief report on efforts by these companies. The state will, of course, only release what information these groups agree is non-proprietary. The results of these discussions will be included in the second draft of the EAP.

## **Scenario Two: Ethanol Plants and Power Lines Destroyed by Domestic Terrorists-**

Several ethanol plants, including some in Illinois are blown up by domestic terrorists who also down electrical transmission lines seriously reducing the amount of ethanol available and reducing electricity available to state citizens.

### **Energy Assurance Plan Strengths**

- **The EAP does a good job of documenting the extent and the infrastructure of the electrical grid** in the state including the critical relationship between electricity provided from the grid and requirements by nuclear facilities. Long term drop out of electricity from the grid to a nuclear electricity generating facility will require shut down and then black start.
- **The EAP provides good detail on the extent and uses of ethanol** in Illinois and the supply to distribution chain, along with how this ethanol is used by the petroleum industry as an additive to gasoline. Despite the scenario, the state would still have sufficient ethanol for mixing with gasoline to meet the state requirements but other states might suffer a shortage
- **The EAP clearly outlines the steps required for the state to change gasoline blend requirements during a shortage.**
- **The EAP addresses**, and the state has discussed with the Renewable Fuels Association (the primary trade organization for the ethanol industry) the **regulatory steps required to change blending requirements temporarily** at the state petroleum terminals.
- **The EAP does a sound job of explaining the steps required to change gasoline blends** in order to increase supply of gasoline and possibly lower prices to consumers.

### **Energy Assurance Plan Weaknesses:**

- **Governor's Authority:** It is not defined within the EAP whether the Governor can stop shipments of ethanol to other states if a shortage were to occur.
- **Monitoring Petroleum Supplies:** This scenario, along with the trucker strike scenario, highlighted the potential weakness apparent in awareness in Illinois regarding responsibility for monitoring petroleum supplies. Clearly, petroleum is a critical component of the state's energy needs and use, but the state has limited regulatory control over petroleum-based products.
- **Conflict between crime scene integrity and energy restoration:** The plan does not address the potential conflict between law enforcement and energy supply restoration efforts in the event of a criminal act such as in this scenario. It was clear from discussions in the breakout sessions and the general session that in the case of a bombing or other criminal act, there could be a grey area between the need of law enforcement to maintain a crime scene and the need for the utility or other energy providers to restore the damaged energy infrastructure. In the case of an ethanol plant, restoration will be a long, arduous process, but in the case of downed power lines or a damaged pipeline, restoration could be performed rapidly. However, if law enforcement is concerned with crime scene contamination, electrical workers may not be allowed access to the scene for restoration. The EAP does not address how the state could assist in these negotiations, and how they could be resolved.
- **Interdependencies between electrical and pipeline operation:** The interdependency between pipelines properly functioning and electricity are not clearly defined in the EAP. Fortunately, a petroleum industry representative did an excellent job of explaining this relationship in the workshops section of the Midwest exercise, but the plan needs to help the state better understand this relationship.

#### **Action Items:**

- **Governor's Authority:** The state of Illinois is the nation's second largest producer of ethanol, producing over 860 million gallons a year. This ethanol, typically, is sold months in advance to users in multiple states. One question asked at the exercise that the EAP could not answer, is whether the Governor could order in-state ethanol plants to hold these shipments or divert them to ethanol terminals, or if this would even be a maneuver the Governor would consider. The state will review regulations to see if this question is addressed and then discuss with the Governor's office whether this is something the Governor would ever consider doing and, if so, under what circumstance. Results from these discussions will be included in the second draft of the EAP.

- **Monitoring petroleum supplies:** This issue was addressed in the general discussion of EAP weaknesses. It became very clear in the exercise discussions that no one in the state government monitors anything beyond state production of petroleum (state oil wells by the Department of Natural Resources). As mentioned in the previous section, the state plans to begin a process by which state personnel will begin to monitor and proactively assess potential energy disruptions and shortages. The state should have personnel in place by the end of 2011 with the release of the second draft of the plan and could begin to monitor supplies by early 2012.
  
- **Conflict between crime scene integrity and energy restoration:** This will have to be dealt with on a case by case basis. The state does communicate with law enforcement when the SEOC is opened after a disaster, and the state could serve (as it often does now in an un-official capacity) as a go-between for law enforcement and private sector energy restoration efforts, but the plan could better define who within the state would serve this role and provide some guidelines for how these decisions will be made. Discussions will be held with law enforcement, the state terrorism task force and the state department of homeland security to develop guidelines. These will be included in the second draft of the EAP to be released at the end of 2011.
  
- **Interdependencies between electrical and pipeline operation:** Interdependencies between various energy supplies and sectors was also discussed in the general discussion, but these are particularly relevant for pipelines which require electricity to keep petroleum products moving. The state will hold discussions with pipeline companies to better understand their requirements and how the state can help. The EAP will include this in the interdependencies report.

### **Scenario Three: Trucker Strike-**

With no relief from several months of escalating diesel costs, independent truckers go on strike causing the flow of goods including propane, gasoline and ethanol to come to a slow down. They also block access to terminals reducing the available supply of gasoline.

#### **Energy Assurance Plan Strengths:**

- **The plan clearly identifies the necessary steps for driver hour waivers** to be issued in order for company trucks to work longer hours (if necessary and appropriate) to provide more goods to state citizens.
- **The plan discusses ways in which the state may temporarily reduce gasoline prices** by changing blending regulations.

#### **Energy Assurance Plan Weaknesses:**

- **This scenario has political implications which the plan does not address.** The scenario clearly showed that labor disputes can significantly disrupt energy supply. Other scenarios were later envisioned by state personnel including strikes by electrical workers or natural gas employees. These politically sensitive issues may not be able to be fully addressed within the plan, but the plan could include language and methods for how the state can address these scenarios.
- **The plan does not adequately capture the priority list for fuel distribution.** It is clear that first responders and critical resources would require fuel first, but the plan does not adequately address how fuel would be appropriated for these first responders and what the priority list would be in the case of a shortage.
- **The plan does not clearly define responsibilities for petroleum monitoring.** It is also not clear what the state can do to alleviate petroleum shortages.
- **State Petroleum Reserve.** The plan identifies a state petroleum reserve but does not identify whether these are strategic reserves or those still in the ground and the mechanism by which this reserve could be released and who would have the authority to release it.
- **Private Sector supplies:** The EAP did not document what sorts of supplies of petroleum the private sector would have. Not only terminals, refineries and pipelines, but private

companies that may purchase large sums of gasoline on contract, and how these supplies might affect private sector requirements for gasoline and/or state requirements.

- **Does the State have anti-gouging laws?:** It was not stated in the EAP, and no state officials present were aware if Illinois has laws that would prevent anyone from taking advantage of the situation presented in the scenarios by unfairly increasing petroleum product pricing, especially gasoline.
- **Governor waiving state taxes on gasoline.** State personnel discussed the possibility of the Governor temporarily suspending taxes on gasoline but no one was sure how he would go about doing this or what decisions or information could be provided to help him with this decision. This could reduce the cost to gasoline to some extent and reassure state citizens. However, the plan does not clearly define what the Governor would be required to do in order to perform this task or how the EAP could be used to best inform the Governor to his options.

#### **Action Items**

- **This scenario has political implications which the plan does not address.** It is difficult to capture political scenarios or how the state can prepare and response to these scenarios in an energy assurance plan. Situations change with different administrations and so will responses. The plan, however, could review historical energy disruptions in the state or country (even possibly international) caused by political scenarios such as strikes, the response to these scenarios and the outcome to best inform the state energy office and the Governor's office for future events. A new sub-section will be added to the potential hazards section of the EAP which does investigate political disruptions, previous state and national responses and outcomes along with a framework for possible Illinois state agency response that focuses solely on how the state can alleviate the situation for its citizens not on political responses.
- **The plan does not adequately capture the priority list for fuel distribution.** The state and municipalities do have fuel contracts, but decisions on who would get priority in the case of extreme shortages and how these priorities are established is not currently defined in the plan. A new section will be added to the plan and interviews will be held with municipalities and the state's Central Management Services, which controls the contract, to determine how this could be developed. Another possibility for Illinois with its ethanol surplus would be the number of first response vehicles which can accept E-85 (a blending of 85% ethanol and 15% gasoline which requires a vehicle be specifically be labeled a "flex fuel" vehicle and the engine be in compliance to accept this fuel). For instance, all police patrol vehicles in the City of Chicago are flex fuel vehicles. Potentially, in significant fuel petroleum shortages, these vehicles could use only E85

with increased production by the terminals, increasing fuel availability for these critical vehicles and increasing the amount of petroleum available for other vehicles. The State is going to further explore this as an option and include this scenario in future versions of the plan.

- **The plan does not clearly define responsibilities for petroleum monitoring.** As mentioned, because there is not specific regulation which allows the state to monitor for petroleum or regulate petroleum, the state currently does not monitor supply. However, the state energy office and the ICC DHS (which is responsible for energy emergencies within the state) have committed to developing methods and expertise for petroleum monitoring and a more thorough response plan to petroleum shortages. The state has hired personnel to server as an energy assurance officer. The second draft of the EAP will update the status of the hiring and the development of a method.
- **State Petroleum Reserve.** The state energy office is aware that the state of Illinois does have a crude oil reserve of 66 million barrels and produces about 9 million barrels a year. This reserve is actually what is in the ground, not in holding tanks and would most likely not be available for immediate use. The state consumes almost 240 million barrels a year. It is unlikely that any discussion on use of the state's petroleum would impact prices or relieve concerned state citizens. It may be better to focus on available petroleum products at refineries, terminals, state contracts and the private sector if efforts are to be made to somehow increase supply in the state and temporarily lower prices. The state energy office will compile a list of petroleum sources (refineries, terminals, storage facilities, privately held) and discuss how the state could access these in the second draft of the EAP.
- **Private Sector Supplies.** Similar to the above discussion, the state will compile a list of private sector companies that 1) require a great deal of petroleum (transportation, delivery 2) may contract and store gasoline. Although these companies may request anonymity, some information regarding the findings of the list will be included in the second draft of the EAP.
- **Governor waiving state taxes on gasoline.** Historically, the Governor has reduced state taxes on gasoline to lower prices on at least one occasion. This could be an option in an energy emergency to reduce prices and ease citizen concerns. This is going to be discussed in further detail in the second draft of the EAP, and discussed with the Governor's office. Potentially, the EAP could develop some guidelines for the Governor on when this could be done and the necessary steps to assist his office in the future if this becomes an option.

## **Conclusions**

An evaluation of the Illinois Energy Assurance Plan during the Midwest interstate exercise indicated that the plan was robust but aspects of the plan require improvement via additional details and more clearly defined actions. Also, components that should be in the plan were not included. The plan did appear to contain valuable information on the energy sources, uses and infrastructure in Illinois and did provide clear information on the chain of command in an energy emergency. The plan, however, lacks certain critical information, particularly in regard to petroleum.

The state plans to address these weaknesses in a number of ways. As was emphasized at the exercise, communication is the key. The state plans to meet with private sector energy providers, critical state agencies, private sector energy users and other states and municipalities regarding their energy assurance needs and plans to address those needs to better integrate our state efforts with theirs and learn from all of these sources. The state will also review FEMA's Emergency Support Function 12 which deals with FEMA's efforts and methods to restore energy supplies after a disruption.

Ultimately, it is the hope of the state of Illinois that the Energy Assurance Plan will become the energy annex to the State Emergency Operations Manual which will make it a dedicated component of the state's permanent response to energy emergencies. This has come about in large part due to the Midwest Exercise and the resulting discussions between state agencies, and a framework for accomplishing this goal by the 3<sup>rd</sup> quarter of 2012 has been developed.

The state wishes to thank the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability and the National Association of State Energy Officials who co-sponsored the event along with the state of Illinois and the City of Chicago. It was clear to the state however, that the latter two, did all the work and should be congratulated on an excellent exercise.

**State of Illinois  
After Action Report  
Intrastate Energy Assurance Exercise**

**April 11, 2012**

## Contents

Attendees from the State Government of Illinois: .....	141
Attendees from State of Illinois LEAP Cities .....	143
Attendees from State of Illinois Private Sector .....	143
Exercise Summary .....	144
General Observations on the Exercise: .....	145
General Strengths of the Exercise: .....	145
General Weaknesses of the Exercise: .....	145
General State Strengths of the Energy Assurance Plan Identified by the Exercise: .....	145
General State Weaknesses Identified: .....	146
Action Items for the next version of the Energy Assurance Plan: .....	147
Scenario One (Module 1): .....	148
Energy Assurance Plan does not address these exercise points: .....	148
Action Items for the next version of the Energy Assurance Plan: .....	148
Scenario One (Module 2): .....	149
Energy Assurance Plan does not address these exercise points: .....	149
Action Items for the next version of the Energy Assurance Plan: .....	150
Scenario One (Module 3): Seventy two hours after the ice storm. ....	151
Energy Assurance Plan does not address these exercise points: .....	151
Action Items for the next version of the Energy Assurance Plan: .....	151
Scenario Two (Module 1): .....	151
Energy Assurance Plan does not address these exercise points: .....	151
Action Items for the next version of the Energy Assurance Plan: .....	152
Scenario Two (Module 2): .....	153
Energy Assurance Plan does not address these exercise points: .....	153
Action Items for the next version of the Energy Assurance Plan: .....	153
Scenario Two (Module 3): .....	154
Energy Assurance Plan does not address these exercise points: .....	154
Action Items for the next version of the Energy Assurance Plan: .....	154

Conclusions.....	154
------------------	-----

**State of Illinois**  
**After Action Report**  
**State Level Energy Assurance Exercise**  
**April 11, 2012**

**Attendees from the State Government of Illinois:**

Robert Bensko  
Homeland Security Director/  
State Energy Emergency Assurance Coordinator  
Illinois Commerce Commission

Doug Scott  
Commissioner  
Illinois Commerce Commission

Phil Hardas  
Illinois Commerce Commission

Bryan Pemble  
Illinois Commerce Commission

Paul Rasch  
Illinois Emergency Management Agency

Diane Hoots  
State of Illinois Central Management Services

Thomas Korty  
Illinois Department of Transportation

Don Kauerauf  
Illinois Emergency Management Agency

Byron Lloyd  
State Energy Office  
Illinois Department of Commerce and Economic Opportunity

Curt Mueller  
Illinois Emergency Management Agency

Rajiv Narielwala

State Energy Assurance Engineer  
Illinois Department of Commerce and Economic Opportunity

Ashley Reichert  
Illinois Statewide Terrorism Task Force

Agnes Mrozowski  
Illinois Department of Commerce and Economic Opportunity

Steffen Mueller  
Principal Economist  
Energy Resources Center

Edie Casella  
Project Manager, Illinois Terrorism Task Force  
Illinois Emergency Management Agency

Kenneth Copenhaver  
Senior Research Engineer  
University of Illinois at Chicago

Martin Dwyer  
Exercise Training Officer  
Illinois Emergency Management Agency

Jonathan Fiepel  
Deputy Director  
Illinois Department of Commerce and Economic Opportunity

Byron Lloyd  
Energy Efficiency Program Administrator  
Illinois Department of Commerce and Economic Opportunity, State Energy Office

Karen May  
State Representative  
Illinois House of Representatives

Agnes Mrozowski  
Assistant Deputy Director  
Illinois Department of Commerce and Economic Opportunity

John Cuttica  
Director  
Energy Resources Center

### **Attendees from State of Illinois LEAP Cities**

Reynaldo Aquino (City of Chicago)  
Assistant Project Director, Energy Division  
City of Chicago

Dwain Deppolder (City of Peoria)  
City of Peoria Fire Department  
Office of Emergency Management

### **Attendees from State of Illinois Private Sector**

#### **Nicor Gas (natural gas providers)**

Bernard Anderson                      Joe Deters

#### **Peoples Gas (Integrus Group) (natural gas providers)**

Michael Arendt                      Thomas Puracchio

#### **Ameren (electrical and natural gas provider)**

Joseph Mullenschlader (Facilitator)                      Michael Marx                      Jackie Voiles

#### **Commonwealth Edison (electrical providers)**

Robert Plant              Claudia Chevere                      Michael Norris

#### **PJM Interconnection (Electrical Transmission Wholesalers)**

Richard Mathias

#### **ExxonMobil**

Bob Elvert

#### **Marathon Petroleum Company**

Mark Doris                      Richard Kadansky

#### **ConocoPhillips**

Richard Haase

#### **BP North America**

Janice Raburn

#### **Enbridge Pipeline**

Joseph Richardson

#### **Shell Pipeline Company**

Keith Smith

## **Illinois Petroleum Council**

Dan Eichholz

### **Exercise Summary**

The exercise was held at the Abraham Lincoln Hotel and Conference Center in downtown Springfield, Illinois from 8am to 4pm on April 11, 2012. Forty five participants registered and forty three attended. There was strong attendance from multiple private and public sector state energy sections including three of the four Illinois state government entities responsible for energy disruption response (Illinois Commerce Commission (ICC) (3 attendees), the State of Illinois Central Management Services (CMS) and Illinois Department of Transportation (IDOT) (2 attendees). Also in attendance, were four members of the Illinois Department of Commerce and Economic Opportunity (DCEO) which administers the energy assurance grant for the state and is becoming more involved in energy assurance. The Private sector attendance from natural gas (5 attendees), electricity (7 attendees), petroleum (5 attendees) and pipeline distribution (3 attendees) was also strong and was geographically distributed from areas throughout the state. Attendees from utility companies that provide power in the Chicago area (ComEd) and downstate (Ameren) were in attendance, as well as, both upstate and downstate natural gas providers (Nicor, Peoples Gas and Ameren). Three of the four state refineries also sent representatives.

Opening remarks from the Chairman of the Illinois Commerce Commission, Doug Scott, and the Deputy Director of the state's Department of Commerce and Economic Opportunity, Jonathan Fiepel, indicated the state's strong interest and investment in energy assurance. Bob Bensko, Homeland Security Director for ICC and the state's energy emergency assurance coordinator moderated the exercise. Joseph Mullenschlader, Security Manager at Ameren, facilitated.

After opening remarks, Ken Copenhaver, with the Energy Resources Center at the University of Illinois at Chicago, a primary contractor on the development of the energy assurance plan, gave an overview of the energy assurance plan and plans by the state to implement an energy assurance role for DCEO within the state's emergency operations procedures. During Mr. Copenhaver's talk, representatives from the three state agencies primarily responsible for energy disruption response (ICC- Bob Bensko, CMS- Diane Hoots and IDOT- Tom Korty) each with a great deal of experience within the State Emergency Operations Center and restoration efforts, gave an overview of their agencies roles in energy restoration, past experiences and what their agency can offer the private sector in an energy emergency. The state also discussed the role of the new Business Emergency Operations Center (BEOC) in future energy restoration efforts.

The exercise itself began shortly after 10:00am. Two scenarios, an ice storm and a tornado outbreak, were presented in the morning and afternoon respectively. Three modules based on time before and after the scenarios were presented. Don Kauerauf, Deputy Chair of the Illinois Terrorism Task Force, provided the closing remarks. He congratulated everyone on an excellent

exercise and emphasized this should just be the start of better communications between the state and the private sector encouraging everyone to attend the Capstone Catastrophic Earthquake Exercise in 2014 where we can revisit the issues addressed by the exercise.

## **General Observations on the Exercise:**

### **General Strengths of the Exercise:**

Good discussion between the private sector and state government representatives was experienced throughout the exercise. While each module had specific questions associated with the event, it became clear there was some redundancy and Mr Mullenschlader responded by moving the conversation along and did an excellent job of eliciting responses and managing the flow of the exercise. It was obvious that the state agencies and private sector companies were learning from each other regarding their roles, responsibilities and resources during an energy restoration. Both the state and private sector obtained new information regarding specific topics such as fuel mixture waivers for refineries and restoration priorities for the state and private sector and general topics such as emergency response preparations, procedures and resources.

As expected, discussion on ways to improve communication played a significant role in the exercise. How different groups communicate internally and with each other before and during an emergency response was discussed, and it became clear this could be improved.

### **General Weaknesses of the Exercise:**

Eventually, the questions prepared for the exercise scenarios became redundant and the focus became more on general response and communication during an energy disruption response. During key discussion points, particularly around fuel waivers and restoration priorities, a resolution was not met and plans to follow up were not discussed at the exercise.

The exercise may have also become a little too focused on private sector. Most questions were aimed at private sector. While this is important, the energy assurance plan is addressing how the state responds to an energy emergency not the private sector.

### **General State Strengths of the Energy Assurance Plan Identified by the Exercise:**

- **Agency Responsibilities and Roles:** Roles and responsibilities for key energy restoration state agencies were tested and defined during the exercise. CMS and IDOT responded to specific questions on their roles including debris removal by IDOT and requisition of good and services by CMS. IEMA responded to the fuel waiver concerns and took responsibility as the agency to contact in this situation, and ICC clearly defined their role as the primary contact agency for the private sector.

- **Representation:** The state was well represented at the exercise including personnel from IEMA, the Illinois Terrorism Task Force (ITTF), DCEO's State Energy Office, the ICC (including the Commissioner) and the State Energy Emergency Assurance Coordinator. These represent the key stakeholders in state energy assurance. This demonstrated the state's desire to work with the private sector more in emergency response and begin to integrate restoration efforts.
- **Energy Disruption Response:** The plan has a good overview of how, when and who within the state responds to energy emergencies. It also outlines the hierarchy of decisions by the state in regards to energy emergency response.

### **General State Weaknesses Identified:**

- **Communications during a disaster:** The exercise identified that often the state and private sector each perform critical functions related to energy restoration without communicating with the other sector. Particularly, the private sector often makes restoration plans without conferring with the state on public sector priorities.

Likewise, the state has a state of the art emergency operations center (State Emergency Operations Center (SEOC)) and the roles played by ICC, CMS and IDOT are critical to energy restoration, but these functions are often performed by the state without communicating with the private sector unless the private sector reaches out on a particular issue. Similarly, the state has multiple resources at their disposal, but the private sector seemed unaware of these. Not all in the private sector knew they could request debris removal or volunteer manpower for basic tasks from the state. Sharing of situational awareness could assist both sectors during restoration efforts and should be considered.

**Pre-disaster communications:** The exercise identified there are occasions when the state or private sector may have better situational awareness, but neither is sharing this information. For instance, following the recent tornado in Harrisburg, Illinois, Ameren knew immediately following the event, the extent of the damage to the electrical grid, but the state was not aware of this for several hours.

A weakness in pre-disaster communication by the state with the private sector was also identified during the exercise. The issues the petroleum refineries identified with difficulties obtaining fuel mixture waivers during disruptions or price spike scenarios revealed the state needs to have these discussions and the appropriate steps to acquire these waivers as efficiently as possible before the disruptions occur. Likewise, the issue

with restoration priorities possibly being different between the state and the private sector could be cleared up by addressing this before a disruption.

- **Redundancies:** Resources, in the form of not only equipment such as debris removal trucks or generators, but also information, is often replicated by the state and the private sector. Each may use their own weather resources, damage assessment teams and public information release personnel during an energy emergency. This may be appropriate when time is of the essence in these situations, but efforts to share resources and information when appropriate could help both groups.
- **Restoration Priorities:** The exercise identified a weakness in the knowledge the state has on what infrastructure is restored first after a disruption, and why. The private sector has a well-defined priority restoration plan, but this may occasionally conflict with what the state has.

#### **Action Items for the next version of the Energy Assurance Plan:**

- **Communications during a disaster:**  
This should be better defined within the plan. How, when and why the state would or would not interact with the private sector needs to be explored. Interviews with primary state and private sector personnel will help understand this better and, perhaps, develop some guidelines for the plan. Two other elements to explore are the state's new WebEOC and the BEOC. How can these each help communication between the state and private sector as they allow anyone in a registered group to quickly type in new information to share with everyone involved in restoration. For instance, Ameren could immediately enter information on damage extent and send this to everyone involved in the BEOC and SEOC.
- **Pre-disaster communications:**  
Certain types of disasters, specifically weather events, can be forecast. The exercise revealed that both the private and public sector are preparing for these events in advance. There is some communication, but there is not a coordinated response. The EAP should identify ways the state and private sector could share information and prepare for the disaster in tandem. Again, it could be that the BEOC and WebEOC would be the venue for this, but guidelines need to be established for when this is done. If the communication disrupts preparations or is not useful, it is not necessary. The EAP will suggest ways the state and private sector could do this to see if it could be implemented.
- **Redundancies:**  
Ways in which the state and private sector can share available resources should be defined. Perhaps the development of a database of available state equipment the private

sector can access would be helpful. It would also be even more helpful if the state were aware of what resources the private sector did or did not have. Interviews with the state and private sector will attempt to determine if either database is possible and attempts will be made to develop both.

- **Restoration Priorities:**

The plan should clearly define state restoration priorities and then get this information to the private sector. The private sector has made it clear that, if they are aware of a state priority, it can be added to their list. In order to better understand state restoration priorities, a GIS database of state facilities with their importance to state functions will be developed with the cooperation of IDOT, CMS and Department of Corrections.

### **Scenario One (Module 1):**

National Weather Service predicts ice storm with one-half to over one inch accumulation.

#### **Energy Assurance Plan does not address these exercise points:**

1. When specifically does private sector contact state prior to an impending energy disruption (if at all)?
2. State notification is required after a certain number of customers lose power or natural gas. This was not in the plan. For instance, if more than 10,000 customers are without power Ameren notifies the state.
3. While the energy assurance plan identifies roles, responsibilities and the hierarchy of state energy emergency response, it does not specify when communication starts. IEMA identified that they would initiate a conference call with ICC, CMS and IDOT SEOC representatives based on the potential for the ice storm but is there a standard or guidelines for when communication begins.
4. IDOT will pre-spray bridges and overpasses prior to a winter storm event.
5. IDOT has very sophisticated monitors along Illinois roadways that can indicate pavement temperature, wind direction and speed, and even the amount of salt and ice on a roadway.
6. Private sector use of mutual aid networks and contractors is not addressed in the EAP.

#### **Action Items for the next version of the Energy Assurance Plan:**

1. Discussions will be held with ICC and the State Emergency Operations Plan (SEOP) will be reviewed to see if guidelines can be established in the plan for when the private sector should contact ICC prior to a potential energy disruption.
2. The plan will identify the guidelines for when the private sector should contact ICC after a disruption (number of customers, extent of infrastructure damage).

3. Plan will better define communication procedures within the state emergency response prior to an energy emergency. Who makes contact when, why etc.
4. No additions required.
5. Plan will explore how IDOT sensors can improve and be implemented into state situational awareness.
6. The plan will add a section on private contractors to the energy sector, their role in energy restoration, any potential problems this could cause to large scale restoration efforts (what if same contractors are used by downstate and upstate energy providers) and discuss this section with the private sector entities that use the contractors.

### **Scenario One (Module 2):**

Twenty four hours after the storm, and it was as severe as predicted. There are numerous downed power lines and trees blocking roadways.

### **Energy Assurance Plan does not address these exercise points:**

1. Does not address the fact that refineries will slow down or shut down prior to a significant weather event. This could impact local gasoline and diesel supply and prices.
2. The EAP does not address the particular steps required by refineries to obtain fuel waivers quickly in scenarios such as this event where it needs to be done almost instantly to not disrupt flow of petroleum products.
3. EAP does not adequately address situation when gas stations cannot pump gas because they have no electricity.
4. EAP does not adequately capture issues with the flow and timeline of petroleum products. For instance, in this scenario, it was identified by the petroleum industry that a petroleum terminal or gas station may or may not have fuel based on how recently they received fuel (terminals receive fuel every three to five days).
5. New information on the number of times the Illinois refineries request a waiver each year (2 to 3 times). This was not identified before and re-emphasizes the need for a streamlined waiver acquisition during emergencies.
6. This module stimulated a vigorous discussion between the state and private electricity providers on restoration priority lists. The private sector made it clear that they have restoration priorities well established.
  - a. ComEd has joint operation centers with municipalities that allow the municipalities to request specific restoration scenarios.
  - b. Ameren has telephone numbers which they distribute only to law enforcement which they can call to request restoration of critical infrastructure.
  - c. Ameren has a five-tiered restoration priority list. The first customers to have their power restored are institutions that provide health care: hospitals, nursing homes,

kidney dialysis centers, and so on. Second are critical government agencies, such as dispatch centers. Then, utility locations, such as sewage treatment plants, water plants, and natural gas pumping stations. The municipality would dictate the fourth level: for example, following a tornado, a municipality requested that power to WalMart be restored so that citizens could purchase items for home repair. Finally, Ameren has a list of homes where machines that provide life support are located so they prioritize restoration to those areas.

- d. The state identified there may be critical restoration facilities which the private sector is not familiar with. For instance, rest areas along interstates are used as warming centers during blizzards.
  - e. It became clear that there is a disconnect between the state and private sector on restoration priorities for electrical and natural gas and further work needs to be done in this area.
7. Credentialing was brought up by the state as law enforcement and IEMA may need to monitor who is allowed in and out of a disaster zone. The private sector made it clear they are opposed to rigorous credentialing but want to work with the state on a streamlined approach. This has also been brought up in the past at the state level exercise.
  8. Driver hour waivers were discussed. It seems the private sector feels the state should allow for driver hour waivers coming in and out of the state, but the state does not allow for waivers when leaving or travelling through the state after an emergency.

#### **Action Items for the next version of the Energy Assurance Plan:**

1. Plan needs to include information on procedures state energy producers (refineries, electrical generating facilities etc) have in regards to severe weather events and how these could impact energy supply. When do they shut down etc.
2. The plan is going to include a section devoted to fuel waivers. What is the current process by which refineries and terminals receive fuel waivers, and how can this be streamlined by the state in an emergency in the future.
3. The next version of the plan will include information on a survey the state is preparing for gas stations which will be sent out by the Illinois Petroleum Marketing Board asking gas stations whether they have backup generation. The state is also exploring ways it could fund, through energy programs either the purchase of generators for key gas stations or at least the electrical hookups required to hook generators up to the facility. The state is going to develop a GIS which will show the location of gas stations and terminals and their electrical generation backup status.
4. The new version of the plan will devote a section to the timeline of the flow and delivery of petroleum and how this could impact state energy needs in the case of a disaster.
5. Refineries and the Illinois Petroleum Council will be contacted and the number of times and reasons waivers have been requested in the past will be listed.

6. The new version of the EAP is going to have a state restoration priority draft list developed, and the state is going to develop a GIS database. The list and database will contain state facilities and their restoration priority to the state. The state will then supply this information to the private sector and discuss ways the state list can be integrated with the private sector lists.
7. A section regarding credentialing will be added to the EAP with suggestions on how it could be handled in disaster zones to maintain security but expedite access to key private sector personnel. Personnel from IEMA, law enforcement and the private sector will be interviewed.
8. Additional discussion regarding driver hour waivers will be added to the plan along with suggestions on how the state could possibly better handle them.

### **Scenario One (Module 3):**

Seventy two hours after the ice storm.

#### **Energy Assurance Plan does not address these exercise points:**

1. Decision on how long to keep SEOC open is on a disaster by disaster basis.

#### **Action Items for the next version of the Energy Assurance Plan:**

1. Define guidelines for how state would decide when to close the SEOC.

### **Scenario Two (Module 1):**

Tornado warnings issued for central and northern Illinois

#### **Energy Assurance Plan does not address these exercise points:**

1. Natural gas company representative explained that flow of natural gas through pipelines is as high in the summer as it is in the winter as during this time the pipelines are used to restore gas quantities in storage areas where it was depleted during the winter months.
2. The utilities communicate with each other in regards to impending weather events. For instance, Bob Plant of ComEd commented they would be contacting utilities to the west to see how the storms were impacting them. The state could also benefit from this information.
3. Communication with electrical wholesalers such as PJM or MISO prior to and during a large-scale electrical disruption could help the state better understand current load and impact to the load. A disruption to the electrical grid less than 20% can usually be re-

routed without impacting supply, but if a generating facility is down for maintenance or not at full capacity for other reasons, the impact could be more significant.

4. The electrical utilities cannot pinpoint the cause of an outage until they are at the scene. The amount of customers without power cannot always be assessed accurately immediately after an event either.
5. Communication between the utilities and the state is critical just before and during a disaster. The utilities need to be able to know and work with the state on what roads need to be cleared first, and they need an understanding of where fuel for vehicles is available. It would also help the utilities to know the location where the state plans to activate their command center(s).
6. Damage to power lines in rural areas may have a longer impact, not necessarily because of priority, but because there is no redundancy in electrical lines in these areas (one line only).
7. The number of employees available to the utilities for restoration can be impacted by the time of year (vacations) and the number of recent disasters (employees taking time off).

#### **Action Items for the next version of the Energy Assurance Plan:**

1. Information on natural gas pipeline flow quantities needs to be determined through conversations with the natural gas companies and research, and a section needs to be added to the EAP with methods to monitor the supply based on these findings updated in the supply disruption tracking plan.
2. Improved communication and guidelines for how and when the state discusses potential weather related disasters with the private sector will be better defined in the EAP. One component of this would be the state asking if the utility has spoken to another utility on the back side of the storm. In addition, the plan will recommend the utility post any information on the BEOC WebEOC.
3. The plan will recommend the ICC or DCEO SEOC representatives contact PJM and MISO (and give the appropriate contact person and information) to get a summary of current load, load potential and any risks to the system from the weather event if possible, just prior to a predicted significant weather event.
4. No additions to the plan required.
5. The plan needs to devote an entire section to communication between the private sector and the state. It could detail how the WebEOC and BEOC could be a part of this and define what information should be shared by who and when.
6. The state is planning to develop a GIS which will include electrical infrastructure. The GIS could include information on where there is no redundancy in power lines. This could be overlayed on the disaster extent map to determine where these areas are. The state could then notify the utilities and local law enforcement to ensure rural customers

are properly addressed. A methodology for this tracking method will be included in the plan.

7. The state plans to offer information to the utilities on personal preparedness plans for their employees. Ways the state can assist with ensuring energy sector employee's families are safe including offering to check on employees families by local law enforcement will be included in the plan.

### **Scenario Two (Module 2):**

The tornado outbreak has heavily damaged utility companies: the ExxonMobil refinery and Enbridge compression station near Joliet have both experienced severe damage; the Ameren service center near Peoria is also damaged. Electric transmission lines in both areas are damaged.

### **Energy Assurance Plan does not address these exercise points:**

1. There is a great deal of redundancy in natural gas pipelines, and flow can be quickly re-routed.
2. Refineries cannot communicate directly with each other by law, but the terminals would most likely make it clear they had a need for additional petroleum products, and other refineries could compensate for the reduced capacity at the ExxonMobil refinery.
3. Refineries can communicate with the Illinois Petroleum Council (IPC) 24 hours a day. The state could work with the IPC, who did have a representative at the meeting, to better understand current supplies and crude and petroleum product availability.
4. The plan does not adequately capture the impact the crude storage facility in Patoka, Illinois. What is the storage capacity? What is typical? How does the facility impact available supply and can it be used to compensate for reduced supply elsewhere?
5. It was not clear how or if airborne utility line reconnaissance services by the state or others could be made available to the utilities. It was clear this was a service the state could provide and would be helpful, but it did not appear this was something the state could readily do.
6. Sharing situational awareness between the state and the utilities could be better defined in the EAP. It is clear both groups sometimes have more information than the other but how much to share and when to share it remains a question.

### **Action Items for the next version of the Energy Assurance Plan:**

1. The plan will give more detail on natural gas pipelines and redundancy.
2. The plan needs to better address the total capacity and typical operating capacity of different refineries to understand how one refinery can compensate for the loss of another. The state is going to develop a GIS which will include locations and capacities of terminals, gas stations, refineries and pipelines. This information could be combined to understand petroleum product generation, supply and distribution to give the state

more information in the event a refinery goes down. The plan will outline the methods the state will use to do this.

3. Contact information and appropriate questions for the IPC will be added to the plan. A method for accessing IPC to better understand refinery situations will be added to the EAP. The state is also discussing whether to include petroleum industry in monthly or quarterly energy teleconferences. This will be added to the EAP as well.
4. More information regarding the Patoka crude oil facility will be included in the plan. The issue will be researched and personnel from the facility will be interviewed. Capacity, flow and other information will be added, and the location will be included in the state GIS information.
5. The plan will include a section on airborne reconnaissance. What are state capabilities? What can others offer (civil air patrol, federal)? What are the guidelines for the use of state surveillance and how could it be accessed by the private sector?
6. The section in the new EAP addressing communication between the state and private sector will include a sub-topic on the sharing of situational awareness with a discussion on how this could be optimized.

## **Scenario Two (Module 3):**

Seventy two hours after the storm

### **Energy Assurance Plan does not address these exercise points:**

1. If the services for utility customers who have a damaged or destroyed building are not dis-connected following a disaster, they could continue to get billed by the utility company for several months.

### **Action Items for the next version of the Energy Assurance Plan:**

1. The state needs to include this information in various forms to state citizens (on state supported web pages, in press releases after a disaster etc.). Suggestions on how to do this will be included in the next EAP.

## **Conclusions**

The Illinois state-level exercise did a thorough job of testing the state's energy assurance plan. Strengths and weaknesses in the plan, and the way the state responds to energy disruptions were identified. One key component that came out of the exercise was improved communication between the state agencies involved in energy restoration and the private sector restoring the energy. The current plan may adequately capture how the state responds to an energy disruption,

but it could be improved in its explanation and information on how the state communicates with the private sector. This will be addressed in the next version of the plan. A new section titled ***State Interface with the Private Sector*** will be added to the plan. It is not clear yet, how the new state BEOC or WebEOC could be used to assist with this, but it is clear both could be effective tools. It is understood that the state's interchange of information with the private sector should assist in energy restoration and not hinder operations.

Two key specific topics which came up at the exercise that will be addressed in the next version of the plan included: 1) a streamlined method for fuel waivers to be granted during energy emergencies 2) restoration priority lists being uniform between the state and private sector. These will also be addressed in the next version of the plan. The state will review the current methods by which fuel waivers are granted and determine ways this could be improved, and the state will develop their own priority restoration list and then share this with the private sector to initiate ways to integrate.

Overall, it was the strong opinion of those involved in the exercise and interviewed afterward that the exercise was a success. The plan was thoroughly tested and, while potential improvements were identified, held together well under the scenarios. The new version of the plan to be released later this summer will address the shortcomings identified in the exercise and be released to the state public and private sector for review.

## **State of Illinois Energy Assurance Workshop for Municipalities Lessons Learned and After Action Report**

- There were over 50 registrants for the Northern Illinois workshop in Glen Ellyn and over 40 registrants for the workshop in Springfield.
- Close to half of the registrants from Glen Ellyn and 1/3 of the registrants from Springfield did not attend the sessions.
- Attendance from municipalities was especially low and disappointing as the Illinois Emergency Services Management Association (IESMA) email list was used and over 100 municipalities were contacted and aware of the event. Future workshops like this should consider offering credit or some other form of incentive.
- Dwain Deppolder and Maggie Martino from Peoria and Reynaldo Aquino from Chicago gave presentations on the lessons learned from their local energy assurance plans. Each did an excellent job, and these talks were well received.
- Robert Bensko from Illinois Commerce Commission, Diane Hoots from Illinois Central Management Services and Thomas Korty from Illinois Department of Transportation presented to the groups on their agency's roles in energy emergencies.
- DCEO presented finding from the state of Illinois Energy Assurance Plan, presented statistics on current and past State of Illinois energy use and profile and projected future energy requirements.
- Patrick Engineering and the University of Illinois at Chicago's Energy Resources Center presented on Combined Heat and Power's potential role in future energy emergencies for electrical generation.
- A short exercise was performed and the state agencies and municipalities present were tested and questioned on their activities during an energy emergency.
  - An important finding from the workshop is a repeating theme: The same goods or service provider (i.e. generator rental or fuel supplier) may have contracts with multiple agencies that could exceed their stock if emergency was large enough. A recommendation from the group was the need for contractors to disclose this information or a database to be generated with this information.
  - It was recommended that agencies reach out to suppliers prior to a forecast emergency (such as an ice storm) to make them aware of the situation and the potential need for their good or services. This is done for larger suppliers and providers such as utilities but not currently for smaller suppliers.
  - The municipalities felt comfortable with their communications with critical facilities regarding backup generators etc but did not feel they had a good grasp on fuel supply for these generators beyond 24 to 72 hours.

- In general, the municipalities do not have fuel emergency plans and rely on local fuel stations for short term and the state or federal government for long term fuel shortages.
  - No municipality reported knowledge of a gas station with backup power generation capabilities in their area.
  - Ed Cobau with Illinois Municipal Utilities Association reported one incident where they provided a gas station in Metropolis Illinois with a backup generator so they station could provide fuel for emergency vehicles.
- In conclusion, the workshops allowed the state agencies the opportunity to interact with municipal emergency response personnel and discuss how each responds to an energy emergency along with ways they may be able to assist each other in the future. Attendance was lower than expected but participation was good and there was a useful exchange of information.